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A COMMUNITY HEALTH STUDY OF THE RESIDENTS OF WHITCHURCH-STOUFFVILLE

Volume II: Appendices

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APPENDICES

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APPENDIX A: STUDY RESEARCH TEAM AND ADVISORY COMMITTEES

APPENDIX A

The study research team, the lead members, the advisory committees, and the health study/project organization are presented herein.

- **Ministry of Health (Sponsoring Organization)**

Lesbia F. Smith, M.D.	Senior Medical/Environmental Health Consultant

- **York Regional Health Unit**

J. Owen Slingerland, M.D.	Medical Officer of Health
John Hodgkinson, M.D.	Associate Medical Officer of Health

- **Whitchurch-Stouffville Citizens Advisory Group**

J. Owen Slingerland, M.D.	York Regional MOH
Chairman: John Hodgkinson, M.D.	York Regional A/MOH
Fran Sainsbury, Mayor	Whitchurch-Stouffville
James Sanders, Councillor	Whitchurch-Stouffville
Anne Gagnon, Representative	Residents' Association
Debi Mitchell, Representative	Residents' Association

- **Goss, Gilroy & Associates Ltd.**

Thomas I. Goss, Ph.D.	Project Director
Alex Turnbull	Project Administrator
Pamela Baxter	Survey Supervisor

- **University of Ottawa Health Consultants**

Rama C. Nair, M.Stat., Ph.D.	Epidemiologist
Gisèle Carroll, R.N.	Survey Supervisor

- **MDS Laboratories**

John C. Nixon, M.D.	Medical Consultant

- **MacLaren Plansearch Inc.**

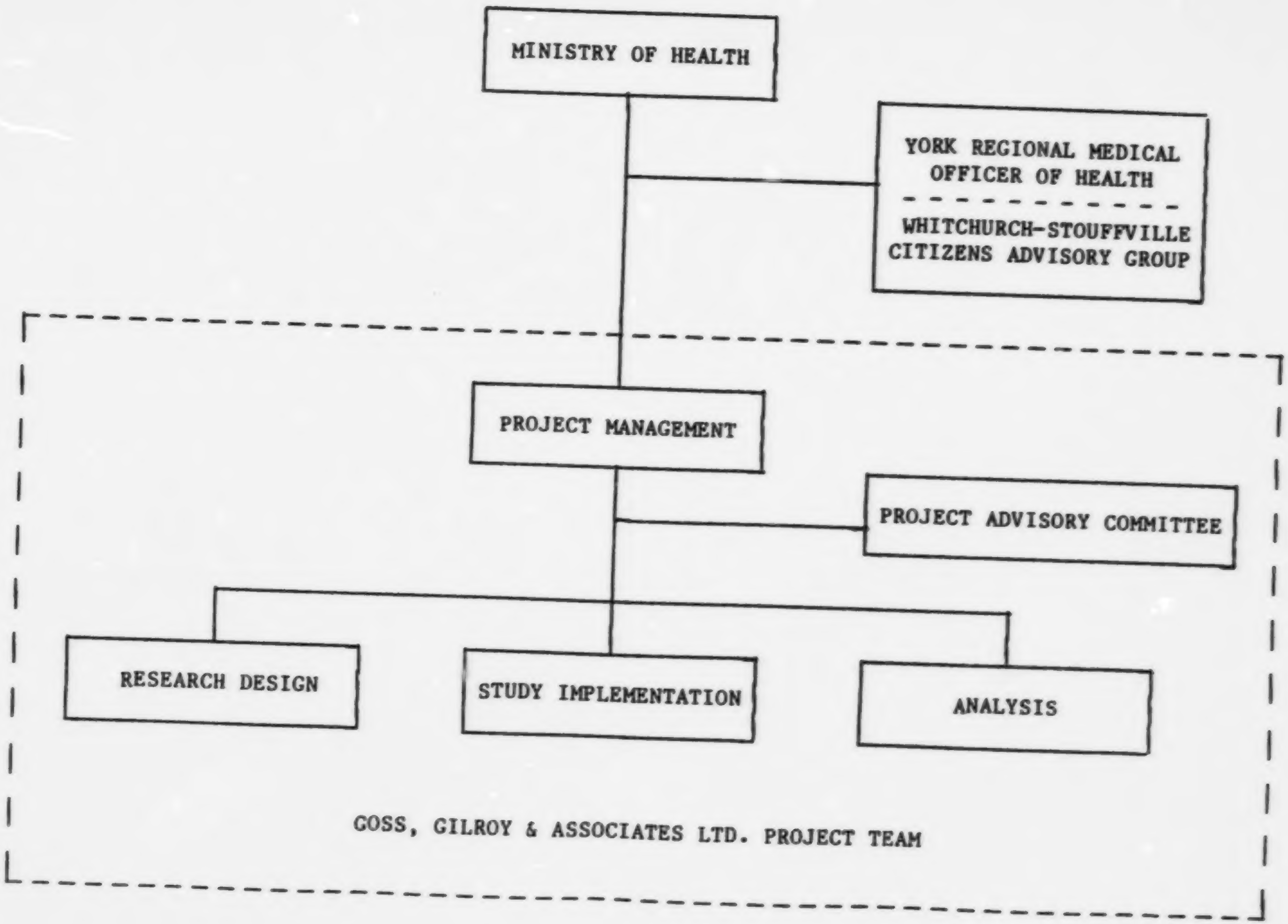
David L. Charlesworth, Ph.D.	Environment Consultant

- **External Consultant**

Dwight T. Janerich, D.D.S., M.P.H.	Epidemiology Advisor

The study/project organization is given in the following chart "HEALTH STUDY ORGANIZATION".

HEALTH STUDY ORGANIZATION


MINISTRY OF HEALTH
YORK REGIONAL MEDICAL OFFICER OF HEALTH
WHITCHURCH-STOUFFVILLE CITIZENS ADVISORY GROUP
PROJECT MANAGEMENT
PROJECT ADVISORY COMMITTEE
RESEARCH DESIGN
STUDY IMPLEMENTATION
ANALYSIS
GOSS, GILROY & ASSOCIATES LTD. PROJECT TEAM

APPENDIX B: COPIES OF CONSENT FORMS

- CONSENT FORMS - VERSION A: NO BLOOD SPECIMEN REQUIRED

GOSS, GILROY
& ASSOCIATES LTD.
Management and Statistical Consultants

Suite 601, 124 O'Connor St
Ottawa, Ontario
K1P 5M9 Canada
(613) 230-5577

COMMUNITY HEALTH STUDY OF THE RESIDENTS OF WHITCHURCH-STOUFFVILLE, EAST GWILLIMBURY AND TECUMSETH

21 March 1986

Dear Sir/Madam:

Please be advised that your household has been selected to participate in the Community Health Study of Whitchurch-Stouffville, East Gwillimbury and Tecumseth. The purpose of the study is to establish whether or not the residents of Whitchurch-Stouffville are experiencing adverse health problems which may be attributable to contaminated water. The study will also assist all three areas in planning and assessing overall health needs and services.

The study is sponsored by the Ontario Ministry of Health and supported by leaders of the three communities, including the Medical Officers of Health in the Regional Municipality of York and the Simcoe County District Health Unit.

The study will involve a telephone interview to obtain general health information on the members of your household, and a follow-up at your physician's office or hospital to obtain medical information for those members of your household reporting health problems.

Your participation in any or all aspects of the survey is entirely voluntary. However, your participation is essential to the success of the study. Without a good level of interest and support expressed by the residents of Whitchurch-Stouffville, East Gwillimbury, and Tecumseth, the study will not be able to satisfactorily meet its intended purpose. Details of the study, including how you were selected, are attached for your review.

Your household's participation in this study is therefore requested. **To indicate your participation, please complete the enclosed consent forms and return them as soon as possible,** in the enclosed prepaid envelope to our Stouffville site office. Instructions on how to complete the consent forms are also enclosed. Any questions you may have should be directed to our site office (416) 640-7252 or toll free at 1-800-387-0407.

Your assistance in participating in this study would be much appreciated.

Yours very truly,

GOSS, GILROY & ASSOCIATES LTD.

Thomas I. Goss

Thomas I. Goss, Ph.D.
Project Director

Rama C. Nair, Ph.D.
Project Epidemiologist

Ontario Ministry of Health
— Public Health Branch

The Regional Municipality of York
— Medical Officer of Health

Simcoe County District Health Unit
— Medical Officer of Health

DETAILED INFORMATION ON
COMMUNITY HEALTH STUDY

STUDY TASK

The Ontario Ministry of Health is sponsoring a community health study of the residents of three areas: **Whitchurch-Stouffville, East Gwillimbury, and Tecumseth.** The study is supported by leaders of the three communities, including the Medical Officers of Health in the Regional Municipality of York and the Simcoe County District Health Unit.

STUDY TEAM

Goss, Gilroy & Associates Ltd., a management and statistical consulting firm based in Ottawa, is responsible for carrying out the study. The study team includes specialists from the University of Ottawa, MDS Laboratories, MacLaren Plansearch Inc. and an internationally-known expert in epidemiology.

PURPOSE

The purpose of the study is to establish whether or not the residents of Whitchurch-Stouffville are experiencing health problems which may be attributable to contaminated water.

NEED FOR COMPARISON COMMUNITIES

Essential to such health studies which investigate disease and health in human populations (the scientific field of epidemiology), is the need to compare the study area (Whitchurch-Stouffville) with other communities having similar population characteristics. East Gwillimbury and Tecumseth have been selected to fulfill this need.

STUDY BENEFITS

Besides attempting to address the health concerns of Whitchurch-Stouffville residents, the health study will assist local government and medical health officials in planning and assessing overall health needs and services in all three participating communities. In other words, residents from East Gwillimbury and Tecumseth also have much to gain from this study.

WHAT DOES THE STUDY SUCCESS DEPEND ON?

The study success depends on a good study design and implementation, a good combination of team members' skills and experiences, dedicated effort and hard work by all involved - but, **most importantly, your participation!** Without a good level of interest and support expressed by **the residents of Whitchurch-Stouffville, East Gwillimbury, and Tecumseth**, the study will not be able to meet its purpose satisfactorily and produce the benefits mentioned above.

.../2

FORM A

HOW WAS I CHOSEN FOR THE STUDY?

A random sample of residents (about 15% of the population) in each of the three communities was chosen to be surveyed. **Your household was one of those chosen.** Of course, you have the option of declining to take part in some or all aspects of this voluntary survey at any time.

HOW WILL THE STUDY BE DONE?

We will need to gather some information about you and your family from a telephone interview and, with your permission, from your medical records. The interviewer will ask questions about the family members' ages and occupations, their state of health, physician and hospital visits, lifestyles, and drinking water consumption habits.

HOW LONG WILL IT TAKE?

The interview will take between fifteen to thirty minutes depending on your situation.

WHO WILL BE INTERVIEWED IN MY HOUSEHOLD?

Since there are some important questions about reproductive outcomes, we would prefer to talk to the woman in the household, if any. If this is not possible, we would like to talk to the man of the household.

WHY MEDICAL RECORDS?

For those family members who have visited a physician or hospital for other than routine care **in the past twelve months**, we are requesting permission to review medical records. The purpose of the medical records review, which will be done by nurses, is two-fold: to collect more information based on clinical diagnoses and to affirm some self-reported information on health and reproductive outcomes. This type of review is an accepted ascertainment procedure in epidemiologic studies. The physicians and hospitals in (and near) the three communities have been (or will soon be) informed about this study by the Medical Officers of Health in your Regional Municipality/County.

CONSENT FORMS

Enclosed with this letter are several consent forms. Would the person to be interviewed please sign the Family Interview Consent Form. If you or any member of your family has visited a physician or hospital in the last twelve months, please fill in and sign the appropriate Adult's and/or Child's Authorization For Review of a Medical Record. Instructions have been provided to assist you in completing these Consent Forms.

NEXT STEP?

We plan to conduct the telephone interviews between April 7th and May 30th, seven days per week, including evenings. In order that we may call you at a time most convenient to you, please mark the times in the box at the upper right corner of the Family Interview Consent Form, and mail these forms back to us at your earliest convenience. An addressed prepaid envelope is enclosed for your convenience.

.../3

CONFIDENTIALITY

All information from the interviews, medical records and blood tests will be used only by members of the research team, and will remain strictly confidential. A code number will be used instead of your name and any identifying information will be kept separate in a secure file in the site office in Stouffville. All identifying information will be destroyed when the study is completed. Only statistical summaries will be published.

STUDY RESULTS

The study will take about fifteen months to complete all tasks, including analyses and reporting. A release of the general, community-level findings to the public is planned upon completion of the study.

FOR FURTHER INFORMATION

If you wish any further information prior to your interview, or at any time, please do not hesitate to call me, collect, at our Ottawa office, or call one of the site survey supervisors, Mrs. Pamela Baxter, B.A., M.B.A. or Mrs. Gisèle Carroll, Reg.N., M.P.H at the Stouffville office number (416) 640-7252 or toll free at 1-800-387-0407.

CONSENT FORM INSTRUCTIONS

The following instructions have been prepared to assist you in completing the appropriate consent forms. Please follow the 4 steps given below:

STEP 1. **Complete Part A. Family Interview** to indicate that you agree to participate in an interview including you and your family.

STEP 2. **Complete Part B. Child Consent Form** for children 17 years of age and under, to provide your consent to having your child's/children's Medical and/or Hospital records reviewed. This consent form should be completed for any child that has visited a physician or hospital **in the past 12 months.** This consent must be signed by the parent or legal guardian, and witnessed by another adult*.

STEP 3. **Complete Part C. Adult Consent Form** for each person 18 years of age and over in your household. Each adult should complete and sign a consent and have his/her signature witnessed*. For example, if there are 3 adults in the household, C.1 to C.3 should be completed, one for each adult.

STEP 4. **Complete the box on Page 1** to indicate your preferred time for an **interview.** Also, make sure to give us your telephone number. This number will be used only for the purpose of this study.

* Please note that a witness may be any person 18 years of age and over, including family members.

Please complete the Consent Forms at your earliest convenience and return them as soon as possible, in the enclosed prepaid envelope to our site office in Stouffville.

If more Consent Forms are required, or if you have any questions, please call us at our site office: 640-7252 (Stouffville) or toll free at 1-800-387-0407.

FORM A

COMMUNITY HEALTH STUDY
CONSENT FORMS

Preferred times for interview
(please specify several times that will be convenient to you)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Morning	___	___	___	___	___	___	___
Afternoon	___	___	___	___	___	___	___
Evening	___	___	___	___	___	___	___

Telephone No.: (   )-
Any other instructions? ____________________
____

A. Family Interview

I, ______________________ agree to be interviewed by a member of the research team of Goss, Gilroy & Associates Ltd., for the Community Health Study of Whitchurch-Stouffville, East Gwillimbury and Tecumseth. I have received a letter explaining the purpose of the study. I understand that I am under no obligation to answer any questions if I do not want to, and that I may terminate the interview at any time.
Full Name

I understand that the information will remain strictly confidential. It will not be possible to identify individuals in any publications or reports. All identifying information will be destroyed when the study is completed.

I understand that I may contact the survey superviser at 640-7252 (Stouffville) or 1-800-387-0407 for any further information. I hereby declare that I am at the full age of majority and have the fullest legal capacity to give this consent.

Signature: ______________________ Date: ______________________

B. Child Consent Form (17 years of age and under)

Authorization for review of Medical and/or Hospital Records.

I, ______________________ give consent on behalf of the child/children listed below, for the release of information from the medical and/or hospital records, to be collected by the research team of Goss, Gilroy & Associates Ltd., for the Community Health Study of Whitchurch-Stouffville, East Gwillimbury and Tecumseth.

I understand that the information obtained will remain strictly confidential and will be used only for the purpose of the Community Health Study. It will be coded before it leaves the physician's and/or hospital premises to ensure that the individual cannot be identified by name or address.

I hereby declare that I am of the fullest legal capacity to give this consent as parent or legal guardian of the child/children listed below:

Full Name of Child/Children	Name of Physician/Hospital
1. ______________________	______________________
2. ______________________	______________________
3. ______________________	______________________
4. ______________________	______________________
5. ______________________	______________________
6. ______________________	______________________

Signature of Parent
or Legal Guardian: ______________________ Date: ______________________

Witnessed by: ______________________

C.1. Adult Consent Form (18 years of age and over)

Authorization for review of Medical and/or Hospital Records.

I, ______________________ give consent for the release of information from the medical and/or
Full Name

hospital records of ______________________ and ______________________, to be collected
Physician(s) Name(s) Hospital Name (if applicable)

by the research team of Goss, Gilroy & Associates Ltd., for the Community Health Study of Whitchurch-Stouffville, East Gwillimbury and Tecumseth.

I understand that the information obtained will remain strictly confidential and will be used only for the purpose of the Community Health Study. It will be coded before it leaves the physician's and/or hospital premises to ensure that the individual cannot be identified by name or address.

Signature: ______________________ Date: ______________________

Witnessed by: ______________________

C.2. **Adult Consent Form** (18 years of age and over)

Authorization for review of Medical and/or Hospital Records.

I, ______________________________ give consent for the release of information from the medical and/or
Full Name
hospital records of ______________________________ and ______________________________, to be collected
Physician(s) Name(s) Hospital Name (if applicable)
by the research team of Goss, Gilroy & Associates Ltd., for the Community Health Study of Whitchurch-Stouffville, East Gwillimbury and Tecumseth.

I understand that the information obtained will remain strictly confidential and will be used only for the purpose of the Community Health Study. It will be coded before it leaves the physician's and/or hospital premises to ensure that the individual cannot be identified by name or address.

Signature: ______________________________ Date: ______________________________

Witnessed by: ______________________________

C.3. **Adult Consent Form** (18 years of age and over)

Authorization for review of Medical and/or Hospital Records.

I, ______________________________ give consent for the release of information from the medical and/or
Full Name
hospital records of ______________________________ and ______________________________, to be collected
Physician(s) Name(s) Hospital Name (if applicable)
by the research team of Goss, Gilroy & Associates Ltd., for the Community Health Study of Whitchurch-Stouffville, East Gwillimbury and Tecumseth.

I understand that the information obtained will remain strictly confidential and will be used only for the purpose of the Community Health Study. It will be coded before it leaves the physician's and/or hospital premises to ensure that the individual cannot be identified by name or address.

Signature: ______________________________ Date: ______________________________

Witnessed by: ______________________________

C.4. **Adult Consent Form** (18 years of age and over)

Authorization for review of Medical and/or Hospital Records.

I, ______________________________ give consent for the release of information from the medical and/or
Full Name
hospital records of ______________________________ and ______________________________, to be collected
Physician(s) Name(s) Hospital Name (if applicable)
by the research team of Goss, Gilroy & Associates Ltd., for the Community Health Study of Whitchurch-Stouffville, East Gwillimbury and Tecumseth.

I understand that the information obtained will remain strictly confidential and will be used only for the purpose of the Community Health Study. It will be coded before it leaves the physician's and/or hospital premises to ensure that the individual cannot be identified by name or address.

Signature: ______________________________ Date: ______________________________

Witnessed by: ______________________________

C.5. **Adult Consent Form** (18 years of age and over)

Authorization for review of Medical and/or Hospital Records.

I, ______________________________ give consent for the release of information from the medical and/or
Full Name
hospital records of ______________________________ and ______________________________, to be collected
Physician(s) Name(s) Hospital Name (if applicable)
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Signature: ______________________________ Date: ______________________________

Witnessed by: ______________________________

- CONSENT FORMS - VERSION B: BLOOD
  SPECIMEN REQUIRED

GOSS, GILROY
& ASSOCIATES LTD.

Management and Statistical Consultants

Suite 601, 124 O Connor St
Ottawa, Ontario
K1P 5M9 Canada
(613) 230-5577

COMMUNITY HEALTH STUDY OF THE RESIDENTS OF
WHITCHURCH-STOUFFVILLE, EAST GWILLIMBURY AND TECUMSETH

21 March 1986

Dear Sir/Madam:

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The study is sponsored by the Ontario Ministry of Health and supported by leaders of the three communities, including the Medical Officers of Health in the Regional Municipality of York and the Simcoe County District Health Unit.

The study will involve a telephone interview to obtain general health information on the members of your household, and a follow-up at your physician's office or hospital to obtain medical information for those members of your household reporting health problems. In addition, we are requesting that for those members of your household aged 5 and over, that they provide a small blood specimen to be taken by an MDS Laboratories technician.

Your participation in any or all aspects of the survey is entirely voluntary. However, your participation is essential to the success of the study. Without a good level of interest and support expressed by the residents of Whitchurch-Stouffville, East Gwillimbury, and Tecumseth, the study will not be able to satisfactorily meet its intended purpose. Details of the study, including how you were selected, are attached for your review.

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Your assistance in participating in this study would be much appreciated.

Yours very truly,

GOSS, GILROY & ASSOCIATES LTD.

Thomas I. Goss

Thomas I. Goss, Ph.D.
Project Director

Rama C Nair

Rama C. Nair, Ph.D.
Project Epidemiologist

Ontario Ministry of Health
— Public Health Branch

The Regional Municipality of York
— Medical Officer of Health

Simcoe County District Health Unit
— Medical Officer of Health

DETAILED INFORMATION ON

COMMUNITY HEALTH STUDY

STUDY TASK

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NEED FOR COMPARISON COMMUNITIES

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WHAT DOES THE STUDY SUCCESS DEPEND ON?

The study success depends on a good study design and implementation, a good combination of team members' skills and experiences, dedicated effort and hard work by all involved - but, **most importantly, your participation!** Without a good level of interest and support expressed by **the residents of Whitchurch-Stouffville, East Gwillimbury, and Tecumseth**, the study will not be able to meet its purpose satisfactorily and produce the benefits mentioned above.

.../2

HOW WAS I CHOSEN FOR THE STUDY?

A random sample of residents (about 15% of the population) in each of the three communities was chosen to be surveyed. **Your household was one of those chosen.** Of course, you have the option of declining to take part in some or all aspects of this voluntary survey at any time.

HOW WILL THE STUDY BE DONE?

We will need to gather some information about you and your family from a telephone interview and, with your permission, from your medical records. The interviewer will ask questions about the family members' ages and occupations, their state of health, physician and hospital visits, lifestyles, and drinking water consumption habits.

HOW LONG WILL IT TAKE?

The interview will take between fifteen to thirty minutes depending on your situation.

WHO WILL BE INTERVIEWED IN MY HOUSEHOLD?

Since there are some important questions about reproductive outcomes, we would prefer to talk to the woman in the household, if any. If this is not possible, we would like to talk to the man of the household.

WHY MEDICAL RECORDS?

For those family members who have visited a physician or hospital for other than routine care **in the past twelve months**, we are requesting permission to review medical records. The purpose of the medical records review, which will be done by nurses, is two-fold: to collect more information based on clinical diagnoses and to affirm some self-reported information on health and reproductive outcomes. This type of review is an accepted ascertainment procedure in epidemiologic studies. The physicians and hospitals in (and near) the three communities have been (or will soon be) informed about this study by the Medical Officers of Health in your Regional Municipality/County.

A BLOOD SPECIMEN

A smaller number of households (taken from the original 15% sample of households to be interviewed) have again been randomly selected to participate, with their permission, in a third aspect of the health study - the taking of a small blood specimen (17 ml, or about one-half of one fluid ounce). **Your household was one of those chosen.**

WHY A BLOOD SPECIMEN?

This aspect of the study is perhaps the most important, for it will allow us to make concrete observations about the potential impact of environment on health for each of the three communities.

HOW WILL YOU PROCEED?

With your consent, a licensed technician from MDS Laboratories will visit your home and take a blood specimen from those five years of age and older. The samples will be analysed for hemoglobin, hematocrit and white blood cell count, as well as liver enzymes and cholesterol. The test results will be sent to your family physician, or in lieu of, the Medical Officer of Health for your area.

.../3

CONSENT FORMS

Enclosed with this letter are several consent forms. Would the person to be interviewed please sign the Family Interview Consent Form. If you or any member of your family has visited a physician or hospital in the last twelve months, please fill in and sign the appropriate Adult's and/or Child's Authorization For Review of a Medical Record. If you agree to a blood test, please fill in the appropriate Adult's and/or Child's Blood Specimen Consent Form. Instructions have been provided to assist you in completing these Consent Forms.

NEXT STEP?

We plan to conduct the telephone interviews between April 7th and May 30th, seven days per week, including evenings. In order that we may call you at a time most convenient to you, please mark the times in the box at the upper right corner of the Family Interview Consent Form, and mail these forms back to us at your earliest convenience. An addressed prepaid envelope is enclosed for your convenience. Also, please indicate times when it will be convenient for you to have your blood specimen taken at your home.

CONFIDENTIALITY

All information from the interviews, medical records and blood tests will be used only by members of the research team, and will remain strictly confidential. A code number will be used instead of your name and any identifying information will be kept separate in a secure file in the site office in Stouffville. All identifying information will be destroyed when the study is completed. Only statistical summaries will be published.

STUDY RESULTS

The study will take about fifteen months to complete all tasks, including analyses and reporting. A release of the general, community-level findings to the public is planned upon completion of the study.

FOR FURTHER INFORMATION

If you wish any further information prior to your interview, or at any time, please do not hesitate to call me, collect, at our Ottawa office, or call one of the site survey supervisors, Mrs. Pamela Baxter, B.A., M.B.A. or Mrs. Gisèle Carroll, Reg.N., M.P.H at the Stouffville office number (416) 640-7252 or toll free at 1-800-387-0407.

CONSENT FORM INSTRUCTIONS

The following instructions have been prepared to assist you in completing the appropriate consent forms. Please follow the 10 steps given below:

STEP 1. **Complete Part A. Family Interview** to indicate that you agree to participate in an interview including you and your family.

STEP 2. **Complete Part B. Child Consent Form** for children 17 years of age and under, to provide your consent to having your child's/children's Medical and/or Hospital records reviewed. This consent form should be completed for any child that has visited a physician or hospital in **the past 12 months.** This consent must be signed by the parent or legal guardian, and witnessed by another adult*.

STEP 3. **Complete Part C. Adult Consent Form** for each person 18 years of age and over in your household. Each adult should complete and sign a consent and have his/her signature witnessed*. For example, if there are 3 adults in the household, C.1 to C.3 should be completed, one for each adult.

STEP 4. **Complete Part D. Adult's Blood Specimen Consent Form** for each adult in your household, to give consent for collection of a blood specimen. Space has been provided in Part D for 2 adults to give consent. If there are more than 2 adults in the household, the other adults must complete Part F.

STEP 5. **Complete Part D. Physician's Report-Adult** so that a copy of the blood specimen results may be sent to his/her physician.

STEP 6. **Complete Part E. Child's Blood Specimen Consent Form** for all children in your household 5 **years of age and over,** to give consent for the collection of a blood specimen.

STEP 7. **Complete Part E. Physician's Report-Child** so that a copy of the blood speciment results may be forwarded to your child's/childen's physician.

STEP 8. **Complete Part F. Adult's Blood Specimen Consent Form if there are more that 2 adults in your household.** Follow the instructions given in steps 4 and 5 above for Part D.

STEP 9. **Complete the box on Page 1** to indicate your preferred time for an **interview.** Also, make sure to give us your telephone number. This number will be used only for the purpose of this study.

STEP 10. **Complete the box on Page 3** to indicate your preferred time to provide the blood specimen. Please ensure that all participants are available at that time. You will be contacted to arrange the best time for the visit of the MDS Laboratories technician to your home.

* Please note that a witness may be any person 18 years of age and over, including family members.

Please complete the Consent Forms at your earliest convenience and return them as soon as possible, in the enclosed prepaid envelope to our site office in Stouffville.

If more Consent Forms are required, or if you have any questions, please call us at our site office: 640-7252 (Stouffville) or toll free at 1-800-387-0407.

FORM 8

COMMUNITY HEALTH STUDY
CONSENT FORMS

Preferred times for interview
(please specify several times that will be convenient to you)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Morning	___	___	___	___	___	___	___
Afternoon	___	___	___	___	___	___	___
Evening	___	___	___	___	___	___	___

Telephone No.: ( )-

Any other instructions? ____________________

____________ ____________________

A. **Family Interview**

I, ______________________ agree to be interviewed by a member of the research team of Goss, Gilroy &
Full Name
Associates Ltd., for the Community Health Study of Whitchurch-Stouffville, East Gwillimbury and Tecumseth. I have received a letter explaining the purpose of the study. I understand that I am under no obligation to answer any questions if I do not want to, and that I may terminate the interview at any time.

I understand that the information will remain strictly confidential. It will not be possible to identify individuals in any publications or reports. All identifying information will be destroyed when the study is completed.

I understand that I may contact the survey supervisor at 640-7252 (Stouffville) or 1-800-387-0407 for any further information. I hereby declare that I am at the full age of majority and have the fullest legal capacity to give this consent.

Signature: ______________________ Date: ______________________

B. **Child Consent Form** (17 years of age and under)

Authorization for review of Medical and/or Hospital Records.

I, ______________________ give consent on behalf of the child/children listed below, for the release of information from the medical and/or hospital records, to be collected by the research team of Goss, Gilroy & Associates Ltd., for the Community Health Study of Whitchurch-Stouffville, East Gwillimbury and Tecumseth.

I understand that the information obtained will remain strictly confidential and will be used only for the purpose of the Community Health Study. It will be coded before it leaves the physician's and/or hospital premises to ensure that the individual cannot be identified by name or address.

I hereby declare that I am of the fullest legal capacity to give this consent as parent or legal guardian of the child/children listed below:

	Full Name of Child/Children	Name of Physician/Hospital
1.		
2.		
3.		
4.		
5.		
6.		

Signature of Parent
or Legal Guardian: ______________________ Date: ______________________

Witnessed by: ______________________

C.1 **Adult Consent Form** (18 years of age and over)

Authorization for review of Medical and/or Hospital Records.

I, ______________________ give consent for the release of information from the medical and/or
Full Name
hospital records of ______________________ and ______________________, to be collected
Physician(s) Name(s) Hospital Name (if applicable)
by the research team of Goss, Gilroy & Associates Ltd., for the Community Health Study of Whitchurch-Stouffville, East Gwillimbury and Tecumseth.

I understand that the information obtained will remain strictly confidential and will be used only for the purpose of the Community Health Study. It will be coded before it leaves the physician's and/or hospital premises to ensure that the individual cannot be identified by name or address.

Signature: ______________________ Date: ______________________

Witnessed by: ______________________

C.2. Adult Consent Form (18 years of age and over)

Authorization for review of Medical and/or Hospital Records.

I, ______________________________ give consent for the release of information from the medical and/or
Full Name
hospital records of ______________________________ and ______________________________, to be collected
Physician(s) Name(s) Hospital Name (if applicable)
by the research team of Goss, Gilroy & Associates Ltd., for the Community Health Study of Whitchurch-Stouffville, East Gwillimbury and Tecumseth.

I understand that the information obtained will remain strictly confidential and will be used only for the purpose of the Community Health Study. It will be coded before it leaves the physician's and/or hospital premises to ensure that the individual cannot be identified by name or address.

Signature: ______________________________ Date: ______________________________

Witnessed by: ______________________________

C.3. Adult Consent Form (18 years of age and over)

Authorization for review of Medical and/or Hospital Records.

I, ______________________________ give consent for the release of information from the medical and/or
Full Name
hospital records of ______________________________ and ______________________________, to be collected
Physician(s) Name(s) Hospital Name (if applicable)
by the research team of Goss, Gilroy & Associates Ltd., for the Community Health Study of Whitchurch-Stouffville, East Gwillimbury and Tecumseth.

I understand that the information obtained will remain strictly confidential and will be used only for the purpose of the Community Health Study. It will be coded before it leaves the physician's and/or hospital premises to ensure that the individual cannot be identified by name or address.

Signature: ______________________________ Date: ______________________________

Witnessed by: ______________________________

C.4. Adult Consent Form (18 years of age and over)

Authorization for review of Medical and/or Hospital Records.

I, ______________________________ give consent for the release of information from the medical and/or
Full Name
hospital records of ______________________________ and ______________________________, to be collected
Physician(s) Name(s) Hospital Name (if applicable)
by the research team of Goss, Gilroy & Associates Ltd., for the Community Health Study of Whitchurch-Stouffville, East Gwillimbury and Tecumseth.

I understand that the information obtained will remain strictly confidential and will be used only for the purpose of the Community Health Study. It will be coded before it leaves the physician's and/or hospital premises to ensure that the individual cannot be identified by name or address.

Signature: ______________________________ Date: ______________________________

Witnessed by: ______________________________

C.5. Adult Consent Form (18 years of age and over)

Authorization for review of Medical and/or Hospital Records.

I, ______________________________ give consent for the release of information from the medical and/or
Full Name
hospital records of ______________________________ and ______________________________, to be collected
Physician(s) Name(s) Hospital Name (if applicable)
by the research team of Goss, Gilroy & Associates Ltd., for the Community Health Study of Whitchurch-Stouffville, East Gwillimbury and Tecumseth.

I understand that the information obtained will remain strictly confidential and will be used only for the purpose of the Community Health Study. It will be coded before it leaves the physician's and/or hospital premises to ensure that the individual cannot be identified by name or address.

Signature: ______________________________ Date: ______________________________

Witnessed by: ______________________________

Preferred times for blood specimen
(please specify several times that will be convenient to you)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Morning	___	___	___	___	___	___	___
Afternoon	___	___	___	___	___	___	___
Evening	___	___	___	___	___	___	___

Telephone No.: (   )-

Any other instructions? ____________________

D.1. Adult's Blood Specimen Consent Form (18 years of age and over)

I, ______________________________ hereby consent to the taking by a laboratory technician from MDS
(Full Name)
Laboratories, for the purpose of the Community Health Study of the Whitchurch-Stouffville, East Gwillimbury and Tecumseth, of a blood specimen for laboratory analysis.

It is understood that the results of the blood analysis will be forwarded to my personal physician. The amount of blood needed is 17 ml or less.

I understand that the information will remain strictly confidential. It will not be possible to identify individuals in any publications or reports. All identifying information will be destroyed when the study is completed.

I hereby declare that I am of the full age of majority and have the fullest legal capacity to give this consent.

Signature: ______________________________ Date: ______________________________

Witnessed by: ______________________________

Physician's Report - Adult

We will be happy to send a report of findings to your family physician. Please provide necessary information below.

Physician's Name: ______________________________

Mailing Address: ______________________________

Postal Code: ____________

D.2. Adult's Blood Specimen Consent Form (18 years of age and over)

I, ______________________________ hereby consent to the taking by a laboratory technician from MDS
(Full Name)
Laboratories, for the purpose of the Community Health Study of the Whitchurch-Stouffville, East Gwillimbury and Tecumseth, of a blood specimen for laboratory analysis.

It is understood that the results of the blood analysis will be forwarded to my personal physician. The amount of blood needed is 17 ml or less.

I understand that the information will remain strictly confidential. It will not be possible to identify individuals in any publications or reports. All identifying information will be destroyed when the study is completed.

I hereby declare that I am of the full age of majority and have the fullest legal capacity to give this consent.

Signature: ______________________________ Date: ______________________________

Witnessed by: ______________________________

Physician's Report - Adult

We will be happy to send a report of findings to your family physician. Please provide necessary information below.

Physician's Name: ______________________________

Mailing Address: ______________________________

Postal Code: ____________

E. **Child's Blood Specimen Consent Form*** (ages 5 to 17 inclusive)

I, ______________________________ hereby consent on behalf of the child/children listed below, to the taking
(Full Name of Adult)
by a laboratory technician from MDS Laboratories, for the purpose of the Community Health Study of the Whitchurch-Stouffville, East Gwillimbury and Tecumseth, of a blood specimen for laboratory analysis.

It is understood that the results of the blood analysis will be forwarded to the child's/children's personal physician. The amount of blood needed is 17 ml or less.

I understand that the information will remain strictly confidential. It will not be possible to identify individuals in any publications or reports. All identifying information will be destroyed when the study is completed.

I hereby declare that i am of the fullest legal capacity to give this consent as parent or legal guardian of the child/children listed below:

Full Name of Child/Children — Age

1. ______________________________ ____________
2. ______________________________ ____________
3. ______________________________ ____________
4. ______________________________ ____________
5. ______________________________ ____________
6. ______________________________ ____________
7. ______________________________ ____________
8. ______________________________ ____________

Signature of Parent
or Legal Guardian: ______________________________ Date: ______________________

Witnessed by: ______________________________

*Children must be 5 years of age; otherwise, they are excluded from this part of the study.

Physician's Report - Child

We will be happy to send a report of findings to your child's/children's physician. Please provide necessary information below.

Physician's Name: ______________________________ For which child/children? ______________________
Address: ____

Physician's Name: ______________________________ For which child/children? ______________________
Address: ____

Physician's Name: ______________________________ For which child/children? ______________________
Address: ____

Physician's Name: ______________________________ For which child/children? ______________________
Address: ____

F.1. **Adult's Blood Specimen Consent Form** (18 years of age and over)

I, ______________________________ hereby consent to the taking by a laboratory technician from MDS
(Full Name)
Laboratories, for the purpose of the Community Health Study of the Whitchurch-Stouffville, East Gwillimbury and Tecumseth, of a blood specimen for laboratory analysis.

It is understood that the results of the blood analysis will be forwarded to my personal physician. The amount of blood needed is 17 ml or less.

I understand that the information will remain strictly confidential. It will not be possible to identify individuals in any publications or reports. All identifying information will be destroyed when the study is completed.

I hereby declare that I am of the full age of majority and have the fullest legal capacity to give this consent.

Signature: ______________________________ Date: ________________________

Witnessed by: ______________________________

Physician's Report - Adult

We will be happy to send a report of findings to your family physician. Please provide necessary information below.

Physician's Name: ______________________________

Mailing Address: ____

Postal Code: ____________

F.2. **Adult's Blood Specimen Consent Form** (18 years of age and over)

I, ______________________________ hereby consent to the taking by a laboratory technician from MDS
(Full Name)
Laboratories, for the purpose of the Community Health Study of the Whitchurch-Stouffville, East Gwillimbury and Tecumseth, of a blood specimen for laboratory analysis.

It is understood that the results of the blood analysis will be forwarded to my personal physician. The amount of blood needed is 17 ml or less.

I understand that the information will remain strictly confidential. It will not be possible to identify individuals in any publications or reports. All identifying information will be destroyed when the study is completed.

I hereby declare that I am of the full age of majority and have the fullest legal capacity to give this consent.

Signature: ______________________________ Date: ________________________

Witnessed by: ______________________________

Physician's Report - Adult

We will be happy to send a report of findings to your family physician. Please provide necessary information below.

Physician's Name: ______________________________

Mailing Address: ____

Postal Code: ____________

APPENDIX C: HEALTH QUESTIONNAIRE

GOSS, GILROY
& ASSOCIATES LTD.

Management and Statistical Consultants

☐☐☐ ☐☐☐ ☐☐

DOCKET NUMBER

QUESTIONNAIRE NO. ☐ OF ☐

COMMUNITY HEALTH STUDY
OF THE RESIDENTS OF WHITCHURCH-STOUFFVILLE, EAST GWILLIMBURY, AND TECUMSETH

ONTARIO MINISTRY OF HEALTH

INTERVIEWER QUESTIONNAIRE

Prepared By:

Goss, Gilroy & Associates Ltd.

Suite 601, 124 O'Connor St.
Ottawa, Ontario
K1P 5M9 Canada
(613) 230-5577

Ontario Ministry of Health
— Public Health Branch.

The Regional Municipality of York
— Medical Officer of Health.

Simcoe County District Health Unit
— Medical Officer of Health.

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SECTION I - DEMOGRAPHIC INFORMATION

1. Please name all the people who live in this household, starting with you.....is there anyone else in your household you didn't mention who may be away now at school, in hospital, travelling/on vacation?
2. Ask If appropriate I now want to determine the household relationships. What is the relationship of to you? Use hhld relnsp card
3. Verify sex
4. What is ____'s date of birth? 5. Confirm age in years That would make__:

______

______ ① Away

(NP)

① M ② F

M/Y

SECTION II - ACTIVITY STATUS (PART I)

The next few questions refer to the last 2 weeks, that is since ________. Before I begin the health related questions, I would like to establish the major activity of each person over 15 years of age.

6. What were/was ____ doing most of the last 2 weeks?
If appropriate say: For example.. Working? Housework? School? Retired? Other
7. If appropriate: Was this ____'s usual activity over the last year?
8. If NO What is ____'s usual activity over the last year?(Specify)

H:

P:

R:

A:

W H S R O

① No ② Yes(NP-9)

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SECTION II - ACTIVITY STATUS - PART II

9. During the last 2 weeks, did any member of the family stay in bed at all because of their health?

○ No(12) ○ Yes WHO? → ① Anyone else?

For each person who indicated YES, ask (Q.10 & 11)

10. How many days did ____ stay in bed for all or most of the day? Days

11. What was the main condition, illness or injury which caused ____ to stay in bed?

Next person -10

Check person's Activity Status in Q.6 above and ask appropriate question (12)

12. During the last 2 weeks, did any member of the family miss any (work)(school) (housework) because of their health? (Count any time lost reported above).

○ No(14) ○ Yes WHO? → ① Anyone else?

For each person who indicated yes, ask (Q.13)

13. How many days did illness or injury keep ____ from (work)(school)(housework) for all or most of the day? Days (NP-14)

SECTION III - GENERAL HEALTH STATUS - SHORT TERM CONDITIONS

The following questions are about various aspects of your family's health.

HEALTH PROBLEM CODE (ENTER IN HPRA ABOVE)

14. During the past 2 weeks has anyone in the family had any of the following conditions:

1-Upset stomach?	○ No	○ Yes	Who?	○ 1 Anyone else?
2-Spells of dizziness?	○ No	○ Yes	Who?	○ 2 Anyone else?
3-Loss of appetite?	○ No	○ Yes	Who?	○ 3 Anyone else?
4-Trouble getting to sleep and staying asleep?	○ No	○ Yes	Who?	○ 4 Anyone else?
5-Headaches?	○ No	○ Yes	Who?	○ 5 Anyone else?
6-Lost weight?	○ No	○ Yes	Who?	○ 6 Anyone else?
7-Episodes of diarrhea?	○ No	○ Yes	Who?	○ 7 Anyone else?

If NO condition reported for all family members, go to 17

15. Did ____ see/talk to a doctor about any of these conditions? ○ No ○ Yes (17)

16. What is the main reason that ___ has not seen a doctor about his(her) condition(s)? Is it:

Read list and enter appropriate code. Say:

One: Condition not serious enough?
Two: Condition under control?
Three: Other? (Specify)

Reason Code:
①
②
③ ______

Next person -15

201	301	401	501	601
① Anyone else?	① Anyone else?	① Anyone else?	① Anyone else?	① Anyone else?
00 Less than 1 Days	00 Less than 1 Days	00 Less than 1 Days	00 Less than 1 Days	00 Less than 1 Days
① Anyone else?	① Anyone else?	① Anyone else?	① Anyone else?	① Anyone else?
00 Less than 1 Days (NP-14)	00 Less than 1 Days (NP-14)	00 Less than 1 Days (NP-14)	00 Less than 1 Days (NP-14)	00 Less than 1 Days (NP-14)
HEALTH PROBLEM CODE (ENTER IN HPRA ABOVE)	HEALTH PROBLEM CODE (ENTER IN HPRA ABOVE)	HEALTH PROBLEM CODE (ENTER IN HPRA ABOVE)	HEALTH PROBLEM CODE (ENTER IN HPRA ABOVE)	HEALTH PROBLEM CODE (ENTER IN HPRA ABOVE)
○ 1 Anyone else? ○ 2 Anyone else? ○ 3 Anyone else? ○ 4 Anyone else? ○ 5 Anyone else? ○ 6 Anyone else? ○ 7 Anyone else?	○ 1 Anyone else? ○ 2 Anyone else? ○ 3 Anyone else? ○ 4 Anyone else? ○ 5 Anyone else? ○ 6 Anyone else? ○ 7 Anyone else?	○ 1 Anyone else? ○ 2 Anyone else? ○ 3 Anyone else? ○ 4 Anyone else? ○ 5 Anyone else? ○ 6 Anyone else? ○ 7 Anyone else?	○ 1 Anyone else? ○ 2 Anyone else? ○ 3 Anyone else? ○ 4 Anyone else? ○ 5 Anyone else? ○ 6 Anyone else? ○ 7 Anyone else?	○ 1 Anyone else? ○ 2 Anyone else? ○ 3 Anyone else? ○ 4 Anyone else? ○ 5 Anyone else? ○ 6 Anyone else? ○ 7 Anyone else?
① No ② Yes (NP-17)	① No ② Yes (NP-17)	① No ② Yes (NP-17)	① No ② Yes (NP-17)	① No ② Yes (NP-17)
Reason Code: ① ② ③	Reason Code: ① ② ③	Reason Code: ① ② ③	Reason Code: ① ② ③	Reason Code: ① ② ③

SECTION IV - PREGNANCY OUTCOMES

Ask the following questions for women 65 years of age and younger

The next health section of our survey refers to a series of questions about pregnancy for all women 65 years of age and less in our selected households.

If there are any children in the family, go to 18.

17. Have/has ____ ever been pregnant?

① No ┌ Married (25)
└ Else (NP-26)
② Yes

18. In total, how many times have/has ______ been pregnant?

└─┴─┘ 00-(25)

19. For each pregnancy _____ have/has had, please answer the following questions (A-F). For a multiple birth (such as twins) please answer for each child separately.

Begin at 1st above

A. What was the outcome of the pregnancy?

DO NOT READ UNLESS ASKED

- Ⓑ-Born Alive
- Ⓢ-Born Dead (Stillbirth)
- Ⓜ-Miscarriage
- Ⓐ-Therapeutic Abortion

B. How long did the pregnancy last? Total No. Months

C. What was the date of the outcome? Month and Year

IF S,M,A DO NOT ASK

D. What was the sex of the baby?

E. What was the baby's weight? lbs and oz.

F. Did the baby have any birth defects? If yes - what?

1st
Ⓑ Ⓢ Ⓜ Ⓐ
T └─┘ M/Y └─┴─┴─┘
① M ② F
Wgt └─┴─┴─┘
① No ② Defect:
____
______________└─┴─┘

2nd
Ⓑ Ⓢ Ⓜ Ⓐ
T └─┘ M/Y └─┴─┴─┘
① M ② F
Wgt └─┴─┴─┘
① No ② Defect:
____
______________└─┴─┘

3rd
Ⓑ Ⓢ Ⓜ Ⓐ
T └─┘ M/Y └─┴─┴─┘
① M ② F
Wgt └─┴─┴─┘
① No ② Defect:
____
______________└─┴─┘

4th
Ⓑ Ⓢ Ⓜ Ⓐ
T └─┘ M/Y └─┴─┴─┘
① M ② F
Wgt └─┴─┴─┘
① No ② Defect:
____
______________└─┴─┘

5th
Ⓑ Ⓢ Ⓜ Ⓐ
T └─┘ M/Y └─┴─┴─┘
① M ② F
Wgt └─┴─┴─┘
① No ② Defect:
____
______________└─┴─┘

6th
Ⓑ Ⓢ Ⓜ Ⓐ
T └─┘ M/Y └─┴─┴─┘
① M ② F
Wgt └─┴─┴─┘
① No ② Defect:
____
______________└─┴─┘

202	302	402	502	602
① No ┌ Married (25) └ Else (NP-28)	① No ┌ Married (25) └ Else (NP-28)	① No ┌ Married (25) └ Else (NP-28)	① No ┌ Married (25) └ Else (NP-28)	① No ┌ Married (25) └ Else (NP-28)
② Yes	② Yes	② Yes	② Yes	② Yes
___ OG-(25)	___ OG-(25)	___ OG-(25)	___ OG-(25)	___ OG-(25)
Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ
T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___
①M ②F	①M ②F	①M ②F	①M ②F	①M ②F
Wgt ___	Wgt ___	Wgt ___	Wgt ___	Wgt ___
① No ② Defect:	① No ② Defect:	① No ② Defect:	① No ② Defect:	① No ② Defect:
___	___	___	___	___
___	___	___	___	___
Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ
T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___
①M ②F	①M ②F	①M ②F	①M ②F	①M ②F
Wgt ___	Wgt ___	Wgt ___	Wgt ___	Wgt ___
① No ② Defect:	① No ② Defect:	① No ② Defect:	① No ② Defect:	① No ② Defect:
___	___	___	___	___
___	___	___	___	___
Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ
T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___
①M ②F	①M ②F	①M ②F	①M ②F	①M ②F
Wgt ___	Wgt ___	Wgt ___	Wgt ___	Wgt ___
① No ② Defect:	① No ② Defect:	① No ② Defect:	① No ② Defect:	① No ② Defect:
___	___	___	___	___
___	___	___	___	___
Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ
T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___
①M ②F	①M ②F	①M ②F	①M ②F	①M ②F
Wgt ___	Wgt ___	Wgt ___	Wgt ___	Wgt ___
① No ② Defect:	① No ② Defect:	① No ② Defect:	① No ② Defect:	① No ② Defect:
___	___	___	___	___
___	___	___	___	___
Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ
T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___
①M ②F	①M ②F	①M ②F	①M ②F	①M ②F
Wgt ___	Wgt ___	Wgt ___	Wgt ___	Wgt ___
① No ② Defect:	① No ② Defect:	① No ② Defect:	① No ② Defect:	① No ② Defect:
___	___	___	___	___
___	___	___	___	___
Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ	Ⓑ Ⓢ Ⓜ Ⓐ
T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___	T ___ M/Y ___
①M ②F	①M ②F	①M ②F	①M ②F	①M ②F
Wgt ___	Wgt ___	Wgt ___	Wgt ___	Wgt ___
① No ② Defect:	① No ② Defect:	① No ② Defect:	① No ② Defect:	① No ② Defect:
___	___	___	___	___
___	___	___	___	___

SECTION IV - PREGNANCY OUTCOMES (CONTINUED)

Use this page if more than 6 pregnancies are reported. Continue asking the series of questions (A-F) under Q.19 (these are repeated below for your convenience).

19. For each pregnancy ____ has had, please answer the following questions (A-F). For a multiple birth (such as twins) please answer for each child separately.

Begin at 7th above

A. What was the outcome of the pregnancy?

DO NOT READ UNLESS ASKED

- Ⓑ-Born Alive
- Ⓢ-Born Dead (Stillbirth)
- Ⓜ-Miscarriage
- Ⓐ-Therapeutic Abortion

B. How long did the pregnancy last?
Total No. Months

C. What was the date of the outcome?
Month and Year

IF S,M,A DO NOT ASK

D. What was the sex of the baby?

E. What was the baby's weight?
lbs and oz.

F. Did the baby have any birth defects?
If yes - what?

If more than 12 pregnancies, use 2nd questionnaire

7th
Ⓑ Ⓢ Ⓜ Ⓐ
T └┘ M/Y └┴┴
①M ②F
Wgt └┴┴
① No ② Defect:

8th
Ⓑ Ⓢ Ⓜ Ⓐ
T └┘ M/Y └┴┴
①M ②F
Wgt └┴┴
① No ② Defect:

9th
Ⓑ Ⓢ Ⓜ Ⓐ
T └┘ M/Y └┴┴
①M ②F
Wgt └┴┴
① No ② Defect:

10th
Ⓑ Ⓢ Ⓜ Ⓐ
T └┘ M/Y └┴┴
①M ②F
Wgt └┴┴
① No ② Defect:

11th
Ⓑ Ⓢ Ⓜ Ⓐ
T └┘ M/Y └┴┴
①M ②F
Wgt └┴┴
① No ② Defect:

12th
Ⓑ Ⓢ Ⓜ Ⓐ
T └┘ M/Y └┴┴
①M ②F
Wgt └┴┴
① No ② Defect:

203

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

303

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
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① No ② Defect:

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T ☐ M/Y
① M ② F
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① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

403

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

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T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

503

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

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T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

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T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

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T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

603

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
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① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

Ⓑ Ⓢ Ⓜ Ⓐ
T ☐ M/Y
① M ② F
Wgt
① No ② Defect:

SECTION IV - PREGNANCY OUTCOMES (CONTINUED)

20. During any of your pregnancies did you take any medications other than vitamins and/or iron?

If YES, indicate which pregnancy and ask:

What were the medications? (Specify)

① No (21)
② Yes - What?

1: 7
2: 8
3: 9
4: 10
5: 11
6: 12

☐☐ Edit use only

21. Did you smoke during any of your pregnancies?

If YES, indicate which pregnancy and ask:

On a typical day how many cigarettes did you smoke?

If other that cigarettes, code: 96 cigars
97 pipes
98 cigarillos

① No (22)
② Yes - Number?

1 ☐☐	7 ☐☐
2 ☐☐	8 ☐☐
3 ☐☐	9 ☐☐
4 ☐☐	10 ☐☐
5 ☐☐	11 ☐☐
6 ☐☐	12 ☐☐

☐☐ Edit use only

22. Did you drink alcoholic beverages during any of your pregnancies?

If YES, indicate which pregnancy and ask:

During a typical week, how many drinks did you have?

See Q.61 if "a drink" needs to be defined

① No (23)
② Yes-Number?

1 ☐☐	7 ☐☐
2 ☐☐	8 ☐☐
3 ☐☐	9 ☐☐
4 ☐☐	10 ☐☐
5 ☐☐	11 ☐☐
6 ☐☐	12 ☐☐

☐☐ Edit use only

23. During any of your pregnancies, did you have contact with any type of chemicals or X-rays?

If YES, indicate which pregnancy and ask:

What type of exposure did you have? (Specify)

① No (24)
② Yes-Exposure?

1: 7
2: 8
3: 9
4: 10
5: 11
6: 12

24. During your pregnancies, did you have any complications?

If YES, indicate which pregnancy and ask:

What were the complications? (Specify)

① No (25)
② Yes - What?

1: 7
2: 8
3: 9
4: 10
5: 11
6: 12

☐☐ Edit use only

25. Have/has ____ ever had any problems getting pregnant? ① No ② Yes

26. Were/are ______'s menstrual periods usually normal? ① No ② Yes

27. Did ____ have in the past a "suspected miscarriage"? ① No ② Yes

If appropriate - Next person (17/18)

(NP -17/18)

204	304	404	504	604
① No (21)	① No (21)	① No (21)	① No (21) .	① No (21)
② Yes - What?	② Yes - What?	② Yes - What?	② Yes - What?	② Yes - What?
1: 7	1: 7	1: 7	1: 7	1: 7
2: 8	2: 8	2: 8	2: 8	2: 8
3: 9	3: 9	3: 9	3: 9	9
4:10	4:10	4:10	4:10	10
5:11	5:11	5:11	5:11	5:11
6:12	6:12	6:12	6:12	6:12
☐ Edit use only	☐ Edit use only	☐ Edit use only	☐ Edit use only	☐ Edit use only
① No (22)	① No (22)	① No (22)	① No (22)	① No (22)
② Yes - Number?	② Yes - Number?	② Yes - Number?	② Yes - Number?	② Yes - Number?
1 ☐ 7 ☐	1 ☐ 7 ☐	1 ☐ 7 ☐	1 ☐ 7 ☐	1 ☐ 7 ☐
2 ☐ 8 ☐	2 ☐ 8 ☐	2 ☐ 8 ☐	2 ☐ 8 ☐	2 ☐ 8 ☐
3 ☐ 9 ☐	3 ☐ 9 ☐	3 ☐ 9 ☐	3 ☐ 9 ☐	3 ☐ 9 ☐
4 ☐ 10 ☐	4 ☐ 10 ☐	4 ☐ 10 ☐	4 ☐ 10 ☐	4 ☐ 10 ☐
5 ☐ 11 ☐	5 ☐ 11 ☐	5 ☐ 11 ☐	5 ☐ 11 ☐	5 ☐ 11 ☐
6 ☐ 12 ☐	6 ☐ 12 ☐	6 ☐ 12 ☐	6 ☐ 12 ☐	6 ☐ 12 ☐
☐ Edit use only	☐ Edit use only	☐ Edit use only	☐ Edit use only	☐ Edit use only
① No (23)	① No (23)	① No (23)	① No (23)	① No (23)
② Yes-Number?	② Yes-Number?	② Yes-Number?	② Yes-Number?	② Yes-Number?
1 ☐ 7 ☐	1 ☐ 7 ☐	1 ☐ 7 ☐	1 ☐ 7 ☐	1 ☐ 7 ☐
2 ☐ 8 ☐	2 ☐ 8 ☐	2 ☐ 8 ☐	2 ☐ 8 ☐	2 ☐ 8 ☐
3 ☐ 9 ☐	3 ☐ 9 ☐	3 ☐ 9 ☐	3 ☐ 9 ☐	3 ☐ 9 ☐
4 ☐ 10 ☐	4 ☐ 10 ☐	4 ☐ 10 ☐	4 ☐ 10 ☐	4 ☐ 10 ☐
5 ☐ 11 ☐	5 ☐ 11 ☐	5 ☐ 11 ☐	5 ☐ 11 ☐	5 ☐ 11 ☐
6 ☐ 12 ☐	6 ☐ 12 ☐	6 ☐ 12 ☐	6 ☐ 12 ☐	6 ☐ 12 ☐
☐ Edit use only	☐ Edit use only	☐ Edit use only	☐ Edit use only	☐ Edit use only
① No (24)	① No (24)	① No (24)	① No (24)	① No (24)
② Yes-Exposure?	② Yes-Exposure?	② Yes-Exposure?	② Yes-Exposure?	② Yes-Exposure?
1: 7	1: 7	1: 7	1: 7	1: 7
2: 8	2: 8	2: 8	2: 8	2: 8
3: 9	3: 9	3: 9	3: 9	3: 9
4:10	4:10	4:10	4:10	4:10
5:11	5:11	5:11	5:11	5:11
6:12	6:12	6:12	6:12	6:12
① No (25)	① No (25)	① No (25)	① No (25)	① No (25)
② Yes - What?	② Yes - What?	② Yes - What?	② Yes - What?	② Yes - What?
1: 7	1: 7	1: 7	1: 7	1: 7
2: 8	2: 8	2: 8	2: 8	2: 8
3: 9	3: 9	3: 9	3: 9	3: 9
4:10	4:10	4:10	4:10	4:10
5:11	5:11	5:11	5:11	5:11
6:12	6:12	6:12	6:12	6:12
☐ Edit use only	☐ Edit use only	☐ Edit use only	☐ Edit use only	☐ Edit use only
① No ② Yes	① No ② Yes	① No ② Yes	① No ② Yes	① No ② Yes
① No ② Yes	① No ② Yes	① No ② Yes	① No ② Yes	① No ② Yes
① No ② Yes	① No ② Yes	① No ② Yes	① No ② Yes	① No ② Yes
(NP -17/18)	(NP -17/18)	(NP -17/18)	(NP -17/18)	(NP -17/18)

SECTION V - GENERAL HEALTH STATUS: LONG TERM CONDITIONS

The following question refers to about 30 long term conditions that members of your household may have had in the past or may have now.

28. To the best of your knowledge, during the past 20 years, that is, since 1965, did anyone in the family have, or has anyone now, the following conditions?

			Long term health problem code (enter in HPRA above)
8-Arthritis or rheumatism?	○ No	○ Yes Who? →	○ 8 Anyone else? —
9-Hay fever or other allergies? . . .	○ No	○ Yes Who? →	○ 9 Anyone else? —
10-Any skin problems such as rashes or allergies?	○ No	○ Yes Who? →	○ 10 Anyone else? —
11-Recurring headaches?	○ No	○ Yes Who? →	○ 11 Anyone else? —
12-High blood pressure?.	○ No	○ Yes Who? →	○ 12 Anyone else? —
13-Heart disease?	○ No	○ Yes Who? →	○ 13 Anyone else? —
14-Any emotional disorders (excluding mental retardation?	○ No	○ Yes Who? →	○ 14 Anyone else? —
15-Emphysema or chronic bronchitis? . .	○ No	○ Yes Who? →	○ 15 Anyone else? —
16-Anemia?	○ No	○ Yes Who? →	○ 16 Anyone else? —
17-Diabetes?	○ No	○ Yes Who? →	○ 17 Anyone else? —
18-Thyroid trouble or goitre?	○ No	○ Yes Who? →	○ 18 Anyone else? —
19-Asthma?	○ No	○ Yes Who? →	○ 19 Anyone else? —
20-Stomach ulcer?	○ No	○ Yes Who? →	○ 20 Anyone else? —
21-Liver disorders?	○ No	○ Yes Who? →	○ 21 Anyone else? —
22-Leukemia?	○ No	○ Yes Who? →	○ 22 Anyone else? —
23-Other cancer? (Specify)	○ No	○ Yes Who? →	○ 23 __________ Anyone else? — └┴┘ Edit use only
24-Pneumonia?	○ No	○ Yes Who? →	○ 24 Anyone else? →
25-Intestinal or bowel disorders? . . .	○ No	○ Yes Who? →	○ 25 Anyone else? →
26-Multiple sclerosis?	○ No	○ Yes Who? →	○ 26 Anyone else? →
27-Parkinson's disease?	○ No	○ Yes Who? →	○ 27 Anyone else? —
28-Alzheimer's disease?	○ No	○ Yes Who? →	○ 28 Anyone else? →
29-Cerebral palsy?	○ No	○ Yes Who? →	○ 29 Anyone else? →
30-Mental retardation?	○ No	○ Yes Who? →	○ 30 Anyone else? →
31-Epilepsy?	○ No	○ Yes Who? →	○ 31 Anyone else? →
32-Kidney disease?	○ No	○ Yes Who? →	○ 32 Anyone else? →
33-Paralysis of any kind?	○ No	○ Yes Who? →	○ 33 Anyone else? →
34-Infertility (for either spouse - if appropriate)?	○ No	○ Yes Who? →	○ 34 Anyone else? →
35-Serious trouble with the back or spine?	○ No	○ Yes Who? →	○ 35 Anyone else? →
36-Serious trouble with the legs or hips?	○ No	○ Yes Who? →	○ 36 Anyone else? →
37-Serious trouble with the arms or shoulders?	○ No	○ Yes Who? →	○ 37 Anyone else? —
38-Serious trouble with other bones or joints?	○ No	○ Yes Who? →	○ 38 Anyone else? →
39-Serious trouble with hands or feet?	No	○ Yes Who? →	○ 39 Anyone else? →
40-Serious trouble with memory?	○ No	○ Yes Who? →	○ 40 Anyone else? →

41-
a) Finally, did anyone else in the family have in the past 20 years, or has anyone now, any other long term illness or health condition? Include abnormal development in or as a child, such as slow to walk, slow to talk or learn.

○ No (go to Q.29) ○ Yes Who? →

Long term health problem
○ 41 Anyone else? →

b) What is/was __________'s health problem? (Specify; NP)

└───→ __________ └┴┘

205	305	405	505	605
Long term health problem code (enter in HPRA above)	Long term health problem code (enter in HPRA above)	Long term health problem code (enter in HPRA above)	Long term health problem code (enter in HPRA above)	Long term health problem code (enter in HPRA above)
○ 8 Anyone else? →	○ 8 Anyone else? →	○ 8 Anyone else? →	○ 8 Anyone else? →	○ 8 Anyone else? →
○ 9 Anyone else? →	○ 9 Anyone else? →	○ 9 Anyone else? →	○ 9 Anyone else? →	○ 9 Anyone else? →
○ 10 Anyone else? →	○ 10 Anyone else? →	○ 10 Anyone else? →	○ 10 Anyone else? →	○ 10 Anyone else? →
○ 11 Anyone else? →	○ 11 Anyone else? →	○ 11 Anyone else? →	○ 11 Anyone else? →	○ 11 Anyone else? →
○ 12 Anyone else? →	○ 12 Anyone else? →	○ 12 Anyone else? →	○ 12 Anyone else? →	○ 12 Anyone else? →
○ 13 Anyone else? →	○ 13 Anyone else? →	○ 13 Anyone else? →	○ 13 Anyone else? →	○ 13 Anyone else? →
○ 14 Anyone else? →	○ 14 Anyone else? →	○ 14 Anyone else? →	○ 14 Anyone else? →	○ 14 Anyone else? →
○ 15 Anyone else? →	○ 15 Anyone else? →	○ 15 Anyone else? →	○ 15 Anyone else? →	○ 15 Anyone else? →
○ 16 Anyone else? →	○ 16 Anyone else? →	○ 16 Anyone else? →	○ 16 Anyone else? →	○ 16 Anyone else? →
○ 17 Anyone else? →	○ 17 Anyone else? →	○ 17 Anyone else? →	○ 17 Anyone else? →	○ 17 Anyone else? →
○ 18 Anyone else? →	○ 18 Anyone else? →	○ 18 Anyone else? →	○ 18 Anyone else? →	○ 18 Anyone else? →
○ 19 Anyone else? →	○ 19 Anyone else? →	○ 19 Anyone else? →	○ 19 Anyone else? →	○ 19 Anyone else? →
○ 20 Anyone else? →	○ 20 Anyone else? →	○ 20 Anyone else? →	○ 20 Anyone else? →	○ 20 Anyone else? →
○ 21 Anyone else? →	○ 21 Anyone else? →	○ 21 Anyone else? →	○ 21 Anyone else? →	○ 21 Anyone else? →
○ 22 Anyone else? →	○ 22 Anyone else? →	○ 22 Anyone else? →	○ 22 Anyone else? →	○ 22 Anyone else? →
○ 23 ____________ Anyone else? →	○ 23 ____________ Anyone else? →	○ 23 ____________ Anyone else? →	○ 23 ____________ Anyone else? →	○ 23 ____________ Anyone else? →
☐ Edit use only	☐ Edit use only	☐ Edit use only	☐ Edit use only	☐ Edit use only
○ 24 Anyone else? →	○ 24 Anyone else? →	○ 24 Anyone else? →	○ 24 Anyone else? →	○ 24 Anyone else? →
○ 25 Anyone else? →	○ 25 Anyone else? →	○ 25 Anyone else? →	○ 25 Anyone else? →	○ 25 Anyone else? →
○ 26 Anyone else? →	○ 26 Anyone else? →	○ 26 Anyone else? →	○ 26 Anyone else? →	○ 26 Anyone else? →
○ 27 Anyone else? →	○ 27 Anyone else? →	○ 27 Anyone else? →	○ 27 Anyone else? →	○ 27 Anyone else? →
○ 28 Anyone else? →	○ 28 Anyone else? →	○ 28 Anyone else? →	○ 28 Anyone else? →	○ 28 Anyone else? →
○ 29 Anyone else? →	○ 29 Anyone else? →	○ 29 Anyone else? →	○ 29 Anyone else? →	○ 29 Anyone else? →
○ 30 Anyone else? →	○ 30 Anyone else? →	○ 30 Anyone else? →	○ 30 Anyone else? →	○ 30 Anyone else? →
○ 31 Anyone else? →	○ 31 Anyone else? →	○ 31 Anyone else? →	○ 31 Anyone else? →	○ 31 Anyone else? →
○ 32 Anyone else? →	○ 32 Anyone else? →	○ 32 Anyone else? →	○ 32 Anyone else? →	○ 32 Anyone else? →
○ 33 Anyone else? →	○ 33 Anyone else? →	○ 33 Anyone else? →	○ 33 Anyone else? →	○ 33 Anyone else? →
○ 34 Anyone else? →	○ 34 Anyone else? →	○ 34 Anyone else? →	○ 34 Anyone else? →	○ 34 Anyone else? →
○ 35 Anyone else? →	○ 35 Anyone else? →	○ 35 Anyone else? →	○ 35 Anyone else? →	○ 35 Anyone else? →
○ 36 Anyone else? →	○ 36 Anyone else? →	○ 36 Anyone else? →	○ 36 Anyone else? →	○ 36 Anyone else? →
○ 37 Anyone else? →	○ 37 Anyone else? →	○ 37 Anyone else? →	○ 37 Anyone else? →	○ 37 Anyone else? →
○ 38 Anyone else? →	○ 38 Anyone else? →	○ 38 Anyone else? →	○ 38 Anyone else? →	○ 38 Anyone else? →
○ 39 Anyone else? →	○ 39 Anyone else? →	○ 39 Anyone else? →	○ 39 Anyone else? →	○ 39 Anyone else? →
○ 40 Anyone else? →	○ 40 Anyone else? →	○ 40 Anyone else? →	○ 40 Anyone else? →	○ 40 Anyone else? →
Long term health ○ 41 problem Anyone else? →	Long term health ○ 41 problem Anyone else? →	Long term health ○ 41 problem Anyone else? →	Long term health ○ 41 problem Anyone else? →	Long term health ○ 41 problem Anyone else? →
☐	☐	☐	☐	☐

HEALTH PROBLEM PROBES (Part of Section V) If no health problems are reported for any of the family members, skip to Section VI (Q.33) For each person scan Health Problem Recording Area above and complete one probe below for each unique health problem. Begin by copying/entering problem no. from Health Problem Recording Area. I now would like to ask some further questions on the health problems you mentioned earlier.	In total, 8 unique health problems per family member can be coded in this quest. (4 below and 4 on continuing page) - if more than 8 use 2nd quest.
Transcribe each person's condition codes and ask:	└┴┘ Enter Condition Code
29.1 A In what year did _____'s condition (____) start?	└┴┴┴┘Year
B Does ______ still have (this condition)? STATE CONDITION	① No ② Yes (D)
C In what year was the condition cured?	└┴┴┴┘Year
D Is _____ currently following treatment for this condition?	① No ② Yes
Next condition code or go to next person	└┴┘ Enter Condition Code
30.1 A In what year did _____'s condition (____) start?	└┴┴┴┘Year
B Does ______ still have (this condition)? STATE CONDITION	① No ② Yes (D)
C In what year was the condition cured?	└┴┴┴┘Year
D Is ____ currently following treatment for this condition?	① No ② Yes
Next condition code or go to next person	└┴┘ Enter Condition Code
31.1 A In what year did _____'s condition (____) start?	└┴┴┴┘Year
B Does ______ still have (this condition)? STATE CONDITION	① No ② Yes (D)
C In what year was the condition cured?	└┴┴┴┘Year
D Is _____ currently following treatment for this condition?	① No ② Yes
Next condition code or go to next person	└┴┘ Enter Condition Code
32.1 A In what year did _____'s condition (____) start?	└┴┴┴┘Year
B Does _____ still have (this condition)? STATE CONDITION	① No ② Yes (D)
C In what year was the condition cured?	└┴┴┴┘Year
D Is _____ currently following treatment for this condition?	① No ② Yes

LONG TERM (CHRONIC) CONDITIONS OR PROBLEMS - FOR REFERENCE - USE WITH HPRA

08-Arthritis-Rheumatism
09-Hay fever, allergies
10-Skin rashes, allergies
11-Migraine headaches
12-High blood pressure
13-Heart disease
14-Emotional disorder
15-Emphysema-Bronchitis
16-Anemia
17-Diabetes
18-Thyroid-Goitre
19-Asthma
20-Stomach ulcer
21-Liver disorder
22-Leukemia
23-Other cancer
24-Pneumonia
25-Intestine-Bowel
26-Multiple Sclerosis
27-Parkinson's Disease
28-Alzheimer's
29-Cerebral palsy
30-Mental retardation
31-Epilepsy
32-Kidney disease
33-Any paralysis
34-Infertility
35-Back-Spine
36-Legs-hips
37-Arms-shoulder
38-Bones-joints
39-Hands-feet
40-Memory
41-Other

206	306	406	506	606
Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes	Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes	Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes	Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes	Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes
Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes	Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes	Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes	Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes	Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes
Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes	Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes	Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes	Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes	Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes
Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes	Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes	Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes	Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes	Enter Condition Code Year ① No ② Yes (D) Year ① No ② Yes

HEALTH PROBLEM PROBES (Part of SECTION V) (CONTINUED)	If more than 8 unique health problems, use 2nd questionnaire 107
Next condition code or go to next person	Enter Condition Code
29.2 A In what year did _____'s condition ________ start?	Year
B Does ______ still have (this condition)? **STATE CONDITION**	① No ② Yes (D)
C In what year was the condition cured?	Year
D Is ______ currently following treatment for this condition?	① No ② Yes
Next condition code or go to next person	Enter Condition Code
30.2 A In what year did _____'s condition ________ start?	Year
B Does ______ still have (this condition)? **STATE CONDITION**	① No ② Yes (D)
C In what year was the condition cured?	Year
D Is ______ currently following treatment for this condition?	① No ② Yes
Next condition code or go to next person	Enter Condition Code
31.2 A In what year did _____'s condition ________ start?	Year
B Does _____ still have (this condition)? **STATE CONDITION**	① No ② Yes (D)
C In what year was the condition cured?	Year
D Is _____ currently following treatment for this condition?	① No ② Yes
Next condition code or go to next person	Enter Condition Code
32.2 A In what year did _____'s condition _______ start?	Year
B Does ______ still have (this condition)? **STATE CONDITION**	① No ② Yes (D)
C In what year was the condition cured?	Year
D Is _____ currently following treatment for this condition?	① No ② Yes

LONG TERM (CHRONIC) CONDITIONS OR PROBLEMS - FOR REFERENCE - USE WITH HPRA

08-Arthritis-Rheumatism
09-Hay fever, allergies
10-Skin rashes, allergies
11-Migraine headaches
12-High blood pressure
13-Heart disease
14-Emotional disorder
15-Emphysema-Bronchitis
16-Anemia
17-Diabetes
18-Thyroid-Goitre
19-Asthma
20-Stomach ulcer
21-Liver disorder
22-Leukemia
23-Other cancer
24-Pneumonia
25-Intestine-Bowel
26-Multiple Sclerosis
27-Parkinson's Disease
28-Alzheimer's
29-Cerebral palsy
30-Mental retardation
31-Epilepsy
32-Kidney disease
33-Any paralysis
34-Infertility
35-Back-Spine
36-Legs-hips
37-Arms-should
38-Bones-joint
39-Hands-feet
40-Memory
41-Other

207	307	407	507	607
└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes	└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes	└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes	└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes	└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (└┴┴┴┘Year ① No ② Yes
└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes	└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes	└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes	└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes	└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes
└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes	└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes	└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes	└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes	└┴┘ Enter Condition. Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes
└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes	└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes	└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes	└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes	└┴┘ Enter Condition Code └┴┴┴┘Year ① No ② Yes (D) └┴┴┴┘Year ① No ② Yes

SECTION VI - PHYSICIAN AND HOSPITAL VISITS

The next few questions refer to contacts with physicians and hospitals. I will ask these questions for each family member in turn.

Ask the following questions for each member of the family, whether or not they were ill.

33. During the past 12 months how many times did ___ see or talk to a physician about his (her) health? Include any physician visits you already told me about.	00 None └─┴─┘ Times
If 0 times for the entire family, go to 38	
34. What is the name and address of the physician _____ saw (or talked to) most recently (within the last 12 months)?	Name & Address ________ └─┴─┘ ________ ________ ________ ________
35. What was the main reason for this contact?	① Routine ② →Other, specify ________
36. Is that the physician ______ usually sees for consultation?	① No ② Yes
37. What is the name and address of _____'s usual physician?	① Same OR ________ └─┴─┘ ________ ________ ________
Next person - 33	
38. During the past 12 months, has anyone in this family stayed overnight as a patient in a hospital?	① No (Section VII) ② Yes
39. How many times was ___ admitted to a hospital during the past 12 months?	└─┴─┘ Times
40. Into which hospital (or hospitals) was ____ admitted?	Name & Address 1. ________ └─┴─┘ ________ ________ ________ 2. ________ └─┴─┘ ________ ________ ________ 3. ________ └─┴─┘ ________ ________ ________
Next person -39	

208	308	408	508	608
00 None ⌴ Times	00 None ⌴ Times	00 None ⌴ Times	00 None ⌴ Times	00 None ⌴ Times
Name & Address	Name & Address	Name & Address	Name & Address	Name & Address
① Routine ② → Other, specify	① Routine ② → Other, specify	① Routine ② → Other, specify	① Routine ② → Other, specify	① Routine ② → Other, specify
① No ② Yes	① No ② Yes	① No ② Yes	① No ② Yes	① No ② Yes
① Same as person ⌴ OR	① Same as person ⌴ OR	① Same as person ⌴ OR	① Same as person ⌴ OR	① Same as person ⌴ OR
① No (Section VII) ② Yes	① No (Section VII) ② Yes	① No (Section VII) ② Yes	① No (Section VII) ② Yes	① No (Section VII) ② Yes
⌴ Times	⌴ Times	⌴ Times	⌴ Times	⌴ Times
Name & Address 1. 2. 3.	Name & Address 1. 2. 3.	Name & Address 1. 2. 3.	Name & Address 1. 2. 3.	Name & Address 1. 2. 3.

SECTION VII - DEATHS IN THE HOUSEHOLD

The next few questions refer mainly to those families who have a long history in the area.

41. How many years have you (and your spouse) lived in this residence? If less than 1 year, go to 48	00 Less than 1 └┴┘ Years
42. How many years has your household lived in this township, including any moves within the township? If NO, go to 48	① Less 1 yr(48) └┴┘ Years
43. Has any member of your household died during that period of time?	① No (48) ② Yes
If appropriate, code simultaneously with 43	
44. What was the deceased's relationship to you? (specify) → To Ref.Per.	______ └┴┘
45. In what year did he (she) die?	└┴┴┴┘ Year
46. What age was he (she) at that time?	└┴┘ Age
47. What was the cause of death? (Specify)	______ ______
Repeat 44-47 if more than one person died. Enter responses in columns 2-6.	

FOR EDIT USE ONLY

ICDA Code	└┴┴┴┘
Total Number of deceased	└┘

209	309	409	509	609
00 Less than 1 ① Same as Ref.prsn OR └┴┘ Years	00 Less than 1 ① Same as Ref.prsn OR └┴┘ Years	00 Less than 1 ① Same as Ref.prsn OR └┴┘ Years	00 Less than 1 ① Same as Ref.prsn OR └┴┘ Years	00 Less than 1 ① Same as Ref.prsn OR └┴┘ Years
└┴┴┴┘ Year └┴┘ Age	└┴┴┴┘ Year └┴┘ Age	└┴┴┴┘ Year └┴┘ Age	└┴┴┴┘ Year └┴┘ Age	└┴┴┴┘ Year └┴┘ Age
└┴┴┴┘	└┴┴┴┘	└┴┴┴┘	└┴┴┴┘	└┴┴┴┘

SECTION VIII - OCCUPATION AND WORKING ENVIRONMENT

Now I would like to ask you a few questions about working environment.

Ask the next question, 48, for each person who has been employed - refer to Activity Code W only

48. What kind of work do/does ________ do now? (Give a full description: eg, posting invoices, selling shoes, teaching primary school)

________________ |_|_|

Next person

49. What is the general location of ______'s current (school)(workplace)(activity centre)? Would it be within this township or outside this township?

① Within
② Outside

Next person

50. In the past 20 years, have/has _______ been in a job that exposed him (her) to any special risk of accidents or injuries or to any substance that could endanger his (her) health?

① No
② Yes
③ Don't know

If NO or DON'T KNOW for all persons, go to 52

51a) If YES To what kind of risk or dangerous substance have/has _____ been exposed? (SPECIFY and CODE LATER) (eg. excessive noise or smoke, video-display terminal, open trench, toxic chemical - specify further if possible)

____

____

____

________________ |_|_|

b) In total, how many years have/has _______ been exposed to these risks?

|_|_| Years (NP-51a)

52. On average, how many hours per week does _____ spend away from home, including work, school and other activities? Would you say it is:

Read out time amounts

① None
② Less 20 hrs
③ 20-40 hrs
④ Over 40 hrs

Next person

210	310	410	510	610
① Within ② Outside	① Within ② Outside	① Within ② Outside	① Within ② Outside	① Within ② Outside
① No ② Yes ③ Don't know	① No ② Yes ③ Don't know	① No ② Yes ③ Don't know	① No ② Yes ③ Don't know	① No ② Yes ③ Don't know
___ Years (NP-51a)	___ Years (NP-51a)	___ Years (NP-51a)	___ Years (NP-51a)	___ Years (NP-51a)
① None ② Less 20 hrs ③ 20-40 hrs ④ Over 40 hrs	① None ② Less 20 hrs ③ 20-40 hrs ④ Over 40 hrs	① None ② Less 20 hrs ③ 20-40 hrs ④ Over 40 hrs	① None ② Less 20 hrs ③ 20-40 hrs ④ Over 40 hrs	① None ② Less 20 hrs ③ 20-40 hrs ④ Over 40 hrs

SECTION IX - LIFESTYLES

The next few questions are about your family's general lifestyle and living habits, such as physical activity, smoking and drinking.

For families with children under 15 years, say:	
These questions refer to family members 15 years and over.	
53. Do/does ____ do some physical activity regularly at least three times per week? (eg, sports, walking, swimming, exercise program or a mixture of these)	① No ② Yes ③ Don't know
Next person	
54. In the past, did you or anyone in your household ever smoke cigarettes, cigars, a pipe or cigarillos daily?	
If YES, WHO? If NO for all persons go to 58	① Anyone else?
55. What was the age when ______ first started smoking cigarettes on a regular basis? By regular, I mean at least once a day for at least a year.	00 Not regular 99 Don't know └┴┘ Age
56. Does/do _____ still smoke?	① No ② Yes
If NO for all persons, go to 58	
57. For a typical day during the last 12 months, how many (cigarettes)(cigars)(pipes)(cigarillos) per day did/does _______ smoke? (ie, daily average)	└┴┘ No. cigarett 96 cigars 97 pipes 98 cigarillos 99 Don't know
Next person - 55	
The next few questions are about drinking habits.	
58. In the past, did you or anyone in your household ever drink alcoholic beverages?	
If YES, WHO? If NO for all persons, go to 62	① Anyone else?
59. What was the age when ______ first started drinking?	99 Don't know └┴┘ Age
Next person	
60. Does/do ______ still drink alcoholic beverages?	① No ② Yes
If NO for all persons, go to 62	
61. In a typical week during the last 12 months, how many drinks did ______ have? (ie, weekly average)	00 Less than 1 99 Don't know └┴┘ No. of drinks
Next person - 60	

Where 1 drink is:
-1 pt beer (12oz)
-1 glass wine (4-5oz)
-1shot liquor (1-1½oz) with or without mix.

A shot with beer chaser or a double is 2 drinks

211	311	411	511	611
① No ② Yes ③ Don't know	① No ② Yes ③ Don't know	① No ② Yes ③ Don't know	① No ② Yes ③ Don't know	① No ② Yes ③ Don't know
① Anyone else?	① Anyone else?	① Anyone else?	① Anyone else?	① Anyone else?
00 Not regular 99 Don't know └┴┘ Age	00 Not regular 99 Don't know └┴┘ Age	00 Not regular 99 Don't know └┴┘ Age	00 Not regular 99 Don't know └┴┘ Age	00 Not regular 99 Don't know └┴┘ Age
① No ② Yes	① No ② Yes	① No ② Yes	① No ② Yes	① No ② Yes
└┴┘ No. cigarette 96 cigars 97 pipes 98 cigarillos 99 Don't know	└┴┘ No. cigarette 96 cigars 97 pipes 98 cigarillos 99 Don't know	└┴┘ No. cigarette 96 cigars 97 pipes 98 cigarillos 99 Don't know	└┴┘ No. cigarette 96 cigars 97 pipes 98 cigarillos 99 Don't know	└┴┘ No. cigarette 96 cigars 97 pipes 98 cigarillos 99 Don't know
① Anyone else?	① Anyone else?	① Anyone else?	① Anyone else?	① Anyone else?
99 Don't know └┴┘ Age	99 Don't know └┴┘ Age	99 Don't know └┴┘ Age	99 Don't know └┴┘ Age	99 Don't know └┴┘ Age
① No ② Yes	① No ② Yes	① No ② Yes	① No ② Yes	① No ② Yes
00 Less than 1 99 Don't know └┴┘ No. of drinks	00 Less than 1 99 Don't know └┴┘ No. of drinks	00 Less than 1 99 Don't know └┴┘ No. of drinks	00 Less than 1 99 Don't know └┴┘ No. of drinks	00 Less than 1 99 Don't know └┴┘ No. of drinks

SECTION X - DRINKING WATER AND HEALTH - PART 1

Now I would like to ask you some questions about drinking water and health.

For reference person only

62. First of all, we are interested in knowing the main source of drinking water presently used in your household. I will read 5 possible sources. Is it: Read list and enter appropriate code. Say: One: Town water/public water works? Two: A well? Three: A cistern? Four: Bottled water? Five: Some other source? (Specify)→ (Remember: choose main source)	Main source? ① ② ③ ④ ⑤ ______
63. How long have you used this source (in years)?	00 Less than 1 yr └┴┘Years
64. Within your home, is your drinking water specially treated in any way? (Probe: filters)	① No ② Yes-How? ______ ______
65. Within your home, on an average day, how many glasses of water do you drink? Say Include coffee, tea and mixed fruit juices. A glass of water equals 8 oz.	└┴┘ No. per da
66. Did your household ever use another source of drinking water while you lived in this residence?	① No (69) ② Yes
67. If YES Specify source and the period of time (by date) 1. Town water/public water works 2. A well 3. A cistern 4. Bottled water 5. Other (specify)______	Mo. Yr. Mo. Yr. 1└┴┴┴┘to└┴┴┴┘ 2└┴┴┴┘to└┴┴┴┘ 3└┴┴┴┘to└┴┴┴┘ 4└┴┴┴┘to└┴┴┴┘ 5└┴┴┴┘to└┴┴┴┘
68. Why did you change your source of drinking water? (Specify)______	└┘ Edit use only
69. Are you aware of any health problems of former residents of your dwelling? (Specify)______	① No ② Yes→└┴┘ Edit ③ N.A. (71)
If not applicable (first resident), go to 71	
70. Do you know what area, region or township the former residents moved to? (Probe: within or outside twnsp)	① No ② Yes-wthn twnsp ③ Yes-outside twnsp

Proceed to Part II of DRINKING WATER AND HEALTH (Q.71)
- for reference person only -

SECTION X - DRINKING WATER AND HEALTH - PART II

And now I would like to read you 5 statements about drinking water and health. I would like you to tell me whether you strongly agree, agree, disagree or strongly disagree with each one. (We want the opinion of the Reference Person only).

Be ready for questions on water quality

71. First, man-made chemicals that may be hazardous have been found in your drinking water.

Say each row:

One: Strongly agree
Two: Agree
Three: Disagree
Four: Strongly disagree
Five: Don't know

Chemicals found?
①
②
③
④
⑤

72. Second, your town's water treatment plant removes all potentially harmful man-made chemicals from the drinking water before people drink it.

Say each row:

One: Strongly agree
Two: Agree
Three: Disagree
Four: Strongly disagree
Five: Don't know

Plant removal?
①
②
③
④
⑤

73. Third, drinking water is important enough that we really should study more carefully its effect on human health.

Say each row:

One: Strongly agree
Two: Agree
Three: Disagree
Four: Strongly disagree
Five: Don't know

More study?
①
②
③
④
⑤

74. Fourth, there is enough scientific proof that man-made chemicals in our treated water are hazardous to humans.

Say each row:

One: Strongly agree
Two: Agree
Three: Disagree
Four: Strongly disagree
Five: Don't know

Treated unsafe?
①
②
③
④
⑤

75. Fifth, regardless of how you felt about the last statement, how do your feel about this statement: All traces of man-made chemicals should be removed as soon as possible from our drinking water.

Say each row:

One: Strongly agree
Two: Agree
Three: Disagree
Four: Strongly disagree
Five: Don't know

Remove all traces?
①
②
③
④
⑤

76. I would like to ask you a final question related to your drinking water. Are you satisfied with the quality of your drinking water? If NO, ask why not? (Specify)

② Yes ① No-why?

SECTION XI - EDUCATION

The next question is to be asked of the reference person (and spouse - if applicable)

The next question refers to the education level of yourself (and your spouse - if applicable)

77. What is the highest level of schooling that ______ have/has completed?

Do NOT read list

10-No schooling
20-Some elementary school
30-Completed elementary school
40-Some high school
50-Completed high school
60-Completed trade/technical school
70-Some college/university (undergraduate)
80-Completed college/university degree or diploma
85-Some graduate level
90-Graduate level degree

Next person (spouse only)-if applicable

Highest level?

RP: ○	10	S: ○	10
○	20	○	20
○	30	○	30
○	40	○	40
○	50	○	50
○	60	○	60
○	70	○	70
○	80	○	80
○	85	○	85
○	90	○	90

If asked to explain why this question?

Interviewer note: On the rationale for this question

A prime reason for asking this question is to double-check the representativeness of the random sample selections for the 3 communities under study.

The 3 areas should have similar summary demographic profiles if our random sample procedure produces a representative selection from each community.

In the (rare) instance where an unusual random sample selection (and community profile) results, important appropriate cautionary notes and adjustments to the analysis strategy on the health data may then be provided. Otherwise, the data analysis may be seriously limited or non-validated.

201	301	401	501	601
1 Away	1 Away	1 Away	1 Away	1 Away
(NP)	(NP)	(NP)	(NP)	(NP)
① M ② F	① M ② F	① M ② F	① M ② F	① M ② F
M/Y	M/Y	M/Y	M/Y	M/Y
H P R A	H P R A	H P R A	H P R A	H P R A
W H S R O	W H S R O	W H S R O	W H S R O	W H S R O
① No ② Yes(NP-9)	① No ② Yes(NP-9)	① No ② Yes(NP-9)	① No ② Yes(NP-9)	① No ② Yes(NP-9)

SECTION XII - FAMILY INCOME

Now, the last topic. Although many health expenses are covered by provincial insurance programs, there still continues to be a relationship between a person's health status and income. We would appreciate your answering a general question on your family income to help us study this situation.

Please be assured that, like all the other information you provide these answers will be kept in strictest confidence.

I don't need to know the exact figure, but could you tell me which of the following broad categories your total annual household income, from all sources, falls into.

I will read the list but please stop me when I reach your category.

If asked, explain "annual income" means "total gross household income for the last 12 months"

Say:

Under $10,000 . . . . ①
Between $10,000 and $20,000 . . . . ②
Between $20,000 and $30,000 . . . . ③
Between $30,000 and $40,000 . . . . ④
Between $40,000 and $50,000 . . . . ⑤
Over $50,000 . . . . ⑥

This concludes the interview. Again, I want to stress that the information you have given us will be kept strictly confidential and the results will only be released in summary form where your responses cannot be identified.

Do you have any comments or any questions you would like to ask me?

Thank you very much for your assistance. We greatly appreciate your time and cooperation for helping us.

015

Annual hhld income?
① Less 10K
② 10-20K
③ 20-30K
④ 30-40K
⑤ 40-50K
⑥ Over 50K
⑧ Refusal
⑨ Don't know

APPENDIX D: ENVIRONMENTAL ASSESSMENT AND DEVELOPMENT OF HYDROGEOLOGICAL RISK MODEL FOR WHITCHURCH-STOUFFVILLE (MACLAREN REPORT)

MacLaren Plansearch

ECONOMIC AND SOCIAL STUDIES
ENVIRONMENTAL SCIENCES
TRANSPORTATION STUDIES
COMPUTER SCIENCE
URBAN AND REGIONAL PLANNING
OCEAN SCIENCE AND OPERATIONS
WATER RESOURCES

MacLAREN PLANSEARCH INC
33 YONGE STREET TORONTO ONTARIO CANADA [illegible]
TELEPHONE [illegible] TELEX [illegible] CABLE [illegible]

12 December 1986

Goss, Gilroy and Associates Ltd.
Suite 601
124 O'Connor Street
Ottawa, Ontario
K1P 5M9

Attention: Dr. T. Goss

Whitchurch-Stouffville Health Study

Dear Sir:

We are pleased to submit our report on the Development of a Risk Model for the Whitchurch-Stouffville Health Study.

In this report we present an overview of the Geology and Hydrogeology of the Whitchurch-Stouffville landfill site, along with an outline of the water quality monitoring carried out at the site. Finally we present a description of the way in which the risk model was developed.

Yours very truly,

MacLAREN PLANSEARCH INC.

David L Charlesworth

David L. Charlesworth, Ph.D.
Consulting Hydrogeologist

DLC:smf

encl.

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introduction

1. INTRODUCTION

MacLaren Plansearch Inc. were retained as sub-consultants to assist Goss Gilroy and Associates Ltd. in the Community Health Study of the Residents of Whitchurch-Stouffville for the Ontario Ministry of Health.

The purpose of the overall study is to determine if the residents of Whitchurch-Stouffville are experiencing any adverse health affects from the use of groundwater which might been contaminated as a result of the waste disposal practices carried out at the Whitchurch-Stouffville landfill. A further objective of the study is to establish if there are any measurable risks of future adverse outcomes as a result of current exposure.

MacLaren Plansearch's role in the study was to review the geology and hydrogeology of the area around the landfill site and, on the basis of groundwater flow patterns, develop an exposure model which would serve as a basis for defining a sampling frame and probability model for the epidemiological study. For example, a higher sampling density would be used in those areas where the potential exposure to contaminants was greatest and lower sampling density in areas with less risk of exposure to contaminants.

This report summarizes the review of the geological, hydrogeological and chemical data collected in the earlier studies and presents the exposure model used as a basis for design of the sampling program. A brief description of the geology of the two control areas, Tecumseth and East Gwillimbury, is also included.

section 2

2. SITE DESCRIPTION

2.1 Site History

The site, originally owned by Leidra Farms Ltd., was operated from 1962 to May 1968 by the Whitchurch Disposal Co. Ltd.

In May 1968 the site was purchased by the R.W. Bremner Co. Ltd. but continued to be run by the previous operator until May 1969 when the new owners assumed operation of the site. It is known that liquid industrial wastes were disposed into six natural depressions at the site. Until mid 1970 these depressions were located on both sides of the main access road and are now known as lagoons L1 to L6. In November 1969, the Ontario Water Resources Commission banned liquid waste disposal at the site and, though the ban was removed in January 1970, apparently no additional liquid wastes were accepted at the site. In May 1970, the Whitchurch Township Council passed a by-law banning liquid waste disposal, effective June 15, 1970.

At the end of 1972 the site was acquired by York Sanitation Co. Ltd. and, at that time, York Sanitation was, in turn, purchased by Waste Management Incorporated of Chicago, Illinois.

After the banning of liquid waste disposal, the lagoons were subsequently filled with solid waste, graded and capped with till to reduce the infiltration of precipitation. Most of the open lagoons were filled and capped by early 1974, although work on L1 was not completed until 1976.

No accurate documentation of waste disposal for the years before 1974 is available, but from May 1976 to the closing in June 1985 quarterly reports were prepared which documented waste disposal operations and the removal of cover material from soil borrow areas.

From May to July 1981, Environmental Assessment Board Hearings were held in Stouffville in response to the application by Waste Management Incorporated to extend the life of the site. At this time concerns were expressed by the local citizens that contamination from the landfill was affecting local groundwater supplies and having an adverse impact on the health of the people. The site was allowed to continue operating under a Provisional Certificate of approval with the requirement that additional groundwater monitoring should be carried out.

During the subsequent two to three years, extensive testing of groundwater quality was carried out on water from monitoring holes on site and from nearby domestic wells. The Stouffville municipal wells, located two kilometres to the south, were also tested.

In February 1983 the Environmental Appeal Board issued a Provisional Certificate of Approval for the site which stipulated that waste disposal should cease by June 30, 1985. It also stipulated that additional hydrogeological studies should be completed by December 1983 and be submitted for peer review. On appeal, the date for submission of the report was changed to November 1984.

The site was closed as scheduled in June 1985.

2.2 Physiography and Topography

The site is located on the Oak Ridges Moraine, the location of which is shown on Figure 2.1.

The Oak Ridges Moraine rises to an elevation of almost 400 m and has local relief of 100 m. The regional topography is hummocky with extensive glacial outwash plains and glacial lacustrine deposits extending to the north and northwest. To the south of the moraine the topography is low-lying relatively flat land of the Markham-Pickering till plain.

Original ground elevations on-site are reported to have varied from a high of 351 m GSD in the west central area to a low of 321 m GSD in the north central area. The site generally consisted of a higher area in the southern half, sloping steeply into a low area, with kame hills superimposed, in the northern half.

The north edge of the property consists of knob and kettle topography. The knobs are kames left by the last retreating glacier and the kettles are represented by the small lakes and bogs in the area.

2.3 Regional Hydrology

The site lies less than one mile to the north of the surface water drainage divide between the north draining Holland-Black River basin and the southward draining Duffins Creek - Rouge River basin. Figure 2.2 shows major surface water features and drainage boundaries.

Musselman Lake, located northeast of the site, is a relatively large kettle which, according to Conestoga Rovers and Associates (CRA), consultants to the site owners, has no well defined surface water channels leading into it. They report an intermittent stream draining from the lake towards the lowland area north of the landfill site and conclude that, as no distinct drainage channel or watercourse could be found in the lowland area, the stream apparently seeps into the groundwater system.

Although there are no staff gauges installed in Musselman Lake, and no active controls of the lake level, it appears that a culvert which was installed in 1983 keeps the water level at approximately 325 m GSD.

The bog-like area north of the landfill, towards which the outflow from Musselman Lake flows, itself drains westward beneath highway 48 through a culvert with an invert elevation of 319 m GSD. CRA report that water levels in the bog have thus never been known to rise above 321 m GSD.

The above elevations are critical in determining the likelihood of contaminants from the landfill reaching Musselman Lake by means of overland flow or shallow sub-surface movement. The fact that levels in Musselman Lake are higher than water levels in the swampy lowland to the north of the landfill would appear to preclude overland or shallow sub-surface flow of contaminants from the landfill to the lake.

CRA report that surface water drainage around and on the site is directed mainly to the lowland area north of the site. This lowland area then continues westward, as a well defined feature, to become the east branch of the Holland River. In the vicinity of Hwy. 48 the stream channel is dry in the summer months.

Prior to development as a waste site, approximately half of the site drained into kettles from where the water either evaporated or infiltrated.

2.4 Geology

2.4.1 Bedrock Geology

The bedrock in the area is soft grey shale with a relatively flat surface sloping gently to the west southwest. It is part of the Whitby Formation of Upper Ordovician age and, beneath the site, the elevation of the rock surface is approximately 183 metres GSD.

2.4.2 Surficial Geology

The surficial deposits underlying the site are more than 150 metres thick and, in general terms, consist of an upper less permeable unit of sandy, silty and clay tills overlying permeable deposits described by CRA as a "Regional Sand Aquifer".

The upper till unit is extremely important at the site as it is responsible for the ponding of water which occurs at the surface, and it also restricts the downward movement of contaminants from the landfill.

Regionally the most important unit is the sand aquifer which reaches a thickness of 60 metres along the west end of the site and extends for a considerable distance beyond the limits of the site.

Underlying the aquifer are two till units, separated by a clay/silt deposit. Both tills have low hydraulic conductivities (i.e. are poorly permeable) and thus act as a barrier to downward groundwater movement.

2.5 Hydrogeology

2.5.1 Local

Within the upper till unit there appears to be a system of perched water tables which are fairly complex but which probably flow northwards toward the low ground. There is also, doubtless, a downward component of flow through the upper till into the underlying sand aquifer.

Under the southern portion of the site, the upper till is separated from the water-bearing part of the aquifer by a thick sequence of unsaturated sands. In contrast, adjacent to the swamp along the north side of the site, this thick unsaturated zone is not found.

There are a number of wells within the vicinity of the landfill site which obtain their water from the surficial deposits, though several of the residences have now been given piped water. CRA reported that there were no operating bedrock wells within 6 miles of the site for the following reasons:

1. the overburden generally contains aquifers of significant productivity

2. the overburden is thick, so drilling to bedrock is costly

3. the bedrock is shale and therefore a poor water source

4. the water quality within the bedrock is known to be of naturally poor quality.

The piezometric levels in the main aquifer indicate that flow beneath the site is generally towards the southwest corner from the northern or north-eastern corner of the landfill area (Figure 2.3). There is, however, a groundwater mound in the main aquifer beneath the east-central part of the site. Thus, on a local scale there must be a component of groundwater flow in an easterly or north-easterly direction, which will continue for a relatively short distance before turning to the southwest to join the regional flow. It appears unlikely that this north-easterly component of flow extends beyond the site boundary in a north-easterly direction though it is possible that there is some flow beyond the site boundary in a south-easterly direction. Such movement, however, will be of very limited extent before the flow turns to the southwest to follow the regional trend.

2.5.2 Regional

Groundwater contours prepared on a regional basis indicate a groundwater divide running north of Musselman Lake in an approximately northeast southwest direction. Groundwater from beneath the site and from the Musselman Lake area flows southwesterly and then southerly, discharging into an area of flowing wells and springs west of Highway 48.

This major discharge zone, which runs in an east-west direction, is located about two kilometres south of the site and significant groundwater abstraction occurs in this area, including pumping from the Whitchurch-Stouffville municipal wells. However, on Figure 2.4, worst case estimates of the extents of the zone of influence of the municipal wells are shown and it can be seen that these do not extend beneath the landfill site. Thus, from the groundwater contours and groundwater flow paths marked on that map, it seems unlikely that groundwater which passes beneath the landfill, and possibly becomes contaminated with leachate, will ever reach the municipal wells. Similarly, it is concluded that other pumping, such as the dewatering of gravel pits, is unlikely to have affected contaminant movement.

The regional groundwater contours are shown on Figure 2.4 and a schematic hydrogeological cross-section is given in Figure 2.5.

Calculations carried out by CRA indicate that groundwater in the aquifer beneath the site moves in a southwesterly direction at a velocity of between 100 and 450 metres/year.

2.6 Water Chemistry

2.6.1 General

As described in the introduction, liquid industrial wastes were disposed of into six natural on-site depressions during the early years of the operation. It is these liquid wastes which have caused the most concerns with respect to the health of the surrounding residents and, unfortunately, it is these wastes about which least is known. Thus, in trying to determine what might have gone into the site, in addition to routine municipal garbage, it has been necessary to look at what is currently present in the sub-surface environment of the site.

In Phase II of the Hydrogeologic Study Program undertaken by CRA, the nature and distribution of the on-site wastes were investigated in order to determine how much contamination might be leaving the site.

Observation wells and boreholes were installed through the solid waste, in the vicinity of the former lagoons, to obtain leachate samples and this leachate information, along with analyses of soil samples collected at the same time, is probably the only data available which can provide an indication of what was previously disposed of in the former lagoons.

Leachate samples, primarily representative of solid refuse disposal, were obtained from wells installed outside the area of the former lagoons but within the limit of refuse disposal.

Groundwater quality samples have been collected at the landfill site since 1968. Sampling on a quarterly basis was initiated in 1975 and has been expanded several times since then as dictated by the growing investigative requirements. From November 1981 to October 1983 the MOE conducted a biweekly sampling program which included both on and off-site wells.

As part of the Hydrogeologic Study Program, additional sampling was carried out for on-site observation wells installed in 1983 and 1984, plus selected pre-1983 wells. In this program the perched aquifer and main aquifer groundwater quality was defined and the downgradient impact of landfilling established. Emphasis was placed on sampling "indicator parameters" such as chloride, chemical oxygen demand (COD), conductivity and phenols. These already had a good historical database, the concentration were distinctly higher than background concentrations downgradient from the site and, due to their mobility, they provide an initial warning that other parameters may rise in the future. Elevated values of the indicator parameters do not, in themselves, necessarily mean that the water is harmful to health. For example the drinking water standard for chloride is less than 250 ppm, but this is based on the aesthetic criteria of taste.

2.6.2 The Lagoon Areas

Table 2.1 summarizes the chemistry of the leachate from the lagoon areas and solid refuse disposal areas for conventional parameters and phenols. Where data from more than one well and/or sampling campaign was available for an area, ranges are reported in the table. Values reported are for filtered samples. Samples were collected with copper bailers with no pre-bailing of wells prior to sampling.

TABLE 2.1

SUMMARY OF GENERAL CHEMISTRY - CONVENTIONAL PARAMETERS AND PHENOLS

Parameter	Units	Lagoon 1	Lagoon 2	Lagoon 3	Lagoon 4	Lagoon 5	Lagoon 6	Solid Refuse
Alkalinity	mg/L as $CaCO_3$	982-3150	1660	500	15000	1430-16000	1195-1210	880-15000
Chloride	mg/L	672-1517	270	3500	3200	239-3500	420-450	93-3200
COD	mg/L	711-3201	2080	8450	8550	641-59200	1084-3680	120-464000
Conductivity	µmhos/cm	4100-8900	3600	11900	>20000	4010-26400	4300-4700	1610->20000
Hardness	mg/L	53-1040	1675	4900	17700	684-17100	977-1170	661-17700
pH	pH units	7.4-10.9	7.34	5.69	6.12	5.56-7.94	10.93-11.38	6.12-12.37
Phenols	µg/L	100-264	2800	4030	8610	1.2-13200	2160-2470	17.4-67500
Sulphate	mg/L	<5-250	-	-	<100	19-1650	1060	10-64

The results shown in Table 2.1 are similar to those that might be encountered in a typical solid waste landfill, with a few exceptions. The high pH values reported in some areas are not typical and have been attributed to reports of calcium hydroxide solutions being disposed of at the site. In the area of Lagoon L3 chloride levels are slightly elevated and in the vicinity of Lagoon L4 elevated alkalinity and hardness levels were reported. The extremely high COD value of 464,000 mg/L has been attributed to a possible dilution error during laboratory analysis.

In addition to the more routine chemistry described above extensive data exists on concentrations of priority pollutants and heavy metals in leachate samples from the same on-site monitoring holes. To facilitate review of priority pollutants found on site, a list of compounds which have been reported above the detection limit in one or more monitoring holes is provided in Table 2.2.

The leachate quality with respect to priority pollutants varied from place to place within the site, even over very short distances. The area of Lagoon L5 is a good example of such variations and there is an obvious lack of homogeneity of the fluid. Variation with time was also apparent in some instances where wells have been sampled more than once. In general, contaminant levels were not very high with concentration of only a few parts per billion usually being reported. There were some exceptions, however, with some parameters being uncharacteristically high. In former lagoon areas L1, L3 and L6 a variety of volatile solvents were detected and specifically, at Lagoon L3, the trihalomethane concentrations (bromodichloromethane and bromoform) exceeded the MOE drinking water quality criteria levels. Throughout all areas some of the heavy metal concentrations in the leachates also exceeded the provincial drinking water quality criteria, some only slightly, others by orders of magnitude. The pesticide aldrin was reported to greatly exceed the provincial drinking water criteria at the site of Lagoon L3. However, for most of the compounds detected on-site, no provincial drinking water quality criteria are available on which to base comparisons.

TABLE 2.2

SUMMARY OF PRIORITY POLLUTANTS REPORTED ABOVE DETECTION LIMIT

PARAMETER	Leachate Source						
	L1	L2	L3	L4	L5	L6	Solid Refuse
Base-Neutral Extractables							
Bis (2-chloroisopropyl) ether							✓
Butylbenzyl phthalate							✓
Bis (2-ethylhexyl) phthalate	✓		✓				✓
Di-n-butyl phthalate			✓			✓	✓
Dichlorobenzene		✓	✓				✓
Diethyl phthalate	✓		✓			✓	✓
Isophorone		✓	✓			✓	
Napthalene	✓	✓	✓			✓	✓
1,2 - dichlorobenzene	✓					✓	
HCB					✓		
Acid Extractables							
p-chloro-m-cresol			✓			✓	✓
2,4-Dichlorophenol							
Pentachlorophenol	✓	✓	✓			✓	✓
Phenol	✓	✓	✓	✓	✓	✓	✓
2,4,6-Trichlorophenol	✓		✓			✓	✓
2,4-Dimethyl phthalate	✓		✓			✓	✓
2-Chlorophenol						✓	✓
Pesticides and PCBs							
Aldrin	✓		✓		✓		
DDD			✓				
B-BHC						✓	✓
Chlordane	✓						
A-Endosulfan	✓						
A-BHC					✓		✓
PCB					✓		
Organic Acids and Trimethyl Amine							✓

TABLE 2.2 (cont'd)

SUMMARY OF PRIORITY POLLUTANTS REPORTED ABOVE DETECTION LIMIT

	Leachate Source						
	L1	L2	L3	L4	L5	L6	Solid Refuse
Heavy Metals							
Arsenic	✓				✓		✓
Barium					✓		✓
Cadmium	✓		✓		✓	✓	✓
Chromium	✓	✓	✓		✓		✓
Copper	✓	✓	✓		✓		✓
Lead	✓	✓	✓		✓	✓	✓
Nickel	✓	✓	✓			✓	✓
Silver	✓		✓				✓
Selenium		✓					✓
Zinc	✓	✓	✓		✓	✓	✓
Cobalt		✓	✓				✓
Iron		✓	✓				✓
Manganese		✓	✓		✓		✓
Volatiles							
Benzene			✓		✓	✓	
Bromodichloromethane			✓				
Bromoform			✓				
Chlorobenzene			✓		✓	✓	
1,1-Dichloroethane			✓				
1,1-Dichloroethylene					✓		
trans-1,2-Dichloroethylene			✓				✓
Ethylbenzene			✓		✓	✓	
1,1,2,2-Tetrachloroethane			✓				
1,1,2,2-Tetrachloroethene	✓		✓			✓	
Toluene	✓		✓			✓	
1,1,1-Trichloroethane			✓				
Trichloroethylene	✓		✓			✓	
Xylenes			✓		✓		✓
Methylene chloride	✓					✓	
Dibromochloromethane							✓

One leachate well in the area of Lagoon L5 is noteworthy because an oily waste containing PCB was encountered. Subsequent analyses by MOE indicated that over 96% of the oily material could be classified as petroleum hydrocarbons (gasoline, lubricating and process oils) and high boiling point esters such as plasticizers. The oil layer was almost a meter in thickness but was apparently of limited areal extent as it was not detected in any of the other adjacent monitoring holes.

Soil samples taken from the former sites of Lagoons L2 and L4 confirm the organic analysis of the leachates including contamination with chlorinated phenols and benzenes, and various phthalates. In addition, the soils exhibited the presence of an assortment of polynuclear aromatic hydrocarbons and trace quantities of the pesticides D-BHC, endrin and 4,4'-DDT not reported in the leachate samples.

During soil sampling it was apparent that contaminants had migrated downward and may have reached the saturated portion of the regional aquifer. The varying degree of downward migration of specific compounds can be explained by the attenuating influence of soil adsorption. This adsorption is largely a function of the solubility and partitioning characteristics of the compounds in question and the organic content and grain size distribution of the soil. Phenol is an example of a compound which migrates readily in conjunction with the aqueous phase in the soil. Phthalates, which are less soluble and readily adsorb onto finer grained soils, have a much lower migration potential.

2.6.3 Background Groundwater Quality

Thirteen observation wells completed in the regional aquifer are not directly downgradient from the site and have thus probably not been impacted by landfilling operations. Hence they can reasonably be considered to be indicative of background water quality. Water quality parameter values (Table 2.3) are typically low, consistent with the location of the site in a recharge zone. Similarly, the conductivity, alkalinity and hardness values

TABLE 2.3

REGIONAL AQUIFER - CHARACTERISTICS OF BACKGROUND WATER QUALITY

Parameter	Average Concentration	Range
Alkalinity as $CaCO_3$	222	81 - 390
Chloride as Cl (excepting anomalous values at OW16-83)	5	1.4 - 12.6
COD	>25	
Specific Conductance (umhos/cm)	461	157 - 700
Hardness as $CaCO_3$	238	79 - 410
pH (excepting anomalous values at OW28a-83)	7.85	7.20 - 8.21
Phenols (µg/L) (excepting anomalos values at OW2-78, OW11-83 and OW22-83)	<2	<1 - 5.1
Sulphate as SO_4	17.2	1.5 - 42
Dissolved Organic Carbon (excepting anomalous values at OW2-78)	1.4	0.7 - 3.0

NOTES:
1) All samples filtered prior to analysis.
2) All results expressed as mg/L unless otherwise indicated.
3) Water quality examined from the following wells: OW6-73, OW9-73, OW2-78, OW2-80, OW3-80, OW4-80, OW11a,b-83, OW16-83, OW17-83, OW18-83, OW19-83, OW22a,b-83, OW26-83, OW28a,b-83

Source: Waste Management of Canada, Inc. Hydrogeologic Study Program, Volume I-Text. Canadian Landfill Division, Sanitary Landfill Site No. 4, 1984.

are consistent with the significant percentage of carbonate minerals in the aquifer material. Some anomalously low sulphate levels reported have been attributed to the presence of sulphate reducing bacteria in some locations. Sulphide odours reported in one well support this deduction.

2.6.4 Impacted Groundwater Quality

Analysis of the historical database for chloride content suggests that a number of pulses of contaminated groundwater have impacted downgradient and been detected in on-site and off-site monitoring wells. These pulses are seen as peaks in the time series plots of observed water quality (Figure 2.6) for individual wells. What was probably the tail end of the earliest identifiable pulse is seen in 1968 coinciding with the first groundwater monitoring of the area. The available data, however, is not adequate to determine which former lagoon areas contributed fluid to which contaminant peak.

The distribution of elevated chloride concentrations at or near the water table of the main aquifer is shown in Figure 2.7. Background levels are defined by chloride concentrations of 10 mg/L or less. Two areas of peak concentration, presumably originating from separate sources, are enclosed within a broader contaminant envelope. The figure indicates a decreasing source strength as the highest levels are now located some distance downgradient from their presumed point of origin (ie., the former liquid waste disposal lagoons). At this time the maximum extent to which the contamination appears to extend is 820 metres beyond the southwest corner of the property.

The observed conductivity isopleths closely mimick the areal distribution of chloride in the main aquifer. Phenol concentrations, however, do not demonstrate this distribution. Both high (>2.0 μg/L) and low (<1.0 μg/L) values are found both in non-impacted upgradient and impacted downgradient wells, hence no contouring is possible.

At this landfill site much emphasis has been placed on the monitoring of chloride due to its well-defined distribution and its greater mobility relative to organic contaminants. It was anticipated that increasing chloride levels would provide advance warning of the migration of other contaminants from the site. However, while chloride was always present in downgradient impacted wells, a relationship between chloride concentrations and levels of various organic contaminants has yet to be demonstrated. Only 6 of 32 regional aquifer wells sampled in 1984 for PCB and pesticides contained detectable levels of some of these compounds (HCB, adrin, G-chlordane and endosulfan) and only 2 of these wells were located downgradient of the former liquid waste disposal lagoons.

Additional information on trace organic analyses of the regional aquifer is provided in the following section.

2.6.5 Drinking Water Quality

Hydrogeological considerations suggest that the principal route of off-site contaminant migration is via the regional aquifer underlying the site. Sampling that has been undertaken over the years indicates that some inorganic contaminants (eg., chloride) and phenols have migrated off-site. However, groundwater quality within the regional aquifer at the property boundary is not severely impacted and no parameters have exceeded the provincial water quality criteria to date in any private wells off-site as a result of the landfilling operations. In the light of the concerns of local residents, however, piped water has now been supplied to those homes with actual or potentially impacted wells in the vicinity of the site.

The in-depth sampling program undertaken by the MOE in 1982, which substantiates the above claim, can be briefly summarized as follows. In total 10 wells were sampled which included impacted wells, controls and background wells. The analytical results from this program are extensive and hence are not reproduced here. Briefly, some of the organics detected were specific to individual wells, while others were detected in more than one location.

Some compounds were detected in the private wells, although they were not found in any of the on-site leachate or observation wells.

A wide range of ultra-trace organics were identified in the private wells largely due to the great sensitivity of the analytical procedures utilized. Many of these organics could have been derived from natural sources, human habitation or are generally distributed as air pollutants. For example, the lower aromatic hydrocarbons found such as toluene, xylene and benzene, are commonly encountered in the environment from a variety of sources. The observed aliphatic alcohols are used in detergent formulations. The control and background wells contained similar types and varieties of organics. No industrial organics other than those commonly used in household products (e.g. plastics and food products) were found in the private wells.

One of the private wells tested contained poor quality water due to elevated nitrate and bacterial levels. This contamination was not associated with the landfill operation. (Localized well contamination unrelated to the landfill operation was also discovered during the MOE's quarterly monitoring of area water supplies. These problems were related to bacterial contamination and road salt contamination in the wells.)

The large effort expended by the MOE in the 1982 programme described above was largely in response to the possible presence of bacterial mutagenic activity in a local well concentrate. This activity was indicated by an unconfirmed Salmonella mutagenicity assay test result from the University of Western Ontario in 1981. In early 1982 the laboratories of the Ontario Research Foundation, MOE and the University of Western Ontario re-tested the suspect water source plus 5 additional wells. The combined results of the three laboratories indicated no mutagenic activity in the local well waters, however results from the University of Western Ontario lab introduced some doubt into this conclusion since they reported some activity in two wells (but not in the original well tested by this lab in 1981). The ambiguous data from the one laboratory led to re-testing of some of the previous wells, a new control well and an on-site observation well completed in the main aquifer. Although the drinking wells were tested with concentrates based on 400 liter samples (previous tests were limited to only 20 liter samples), no mutagenicity was indicated for any well by any of the three laboratories.

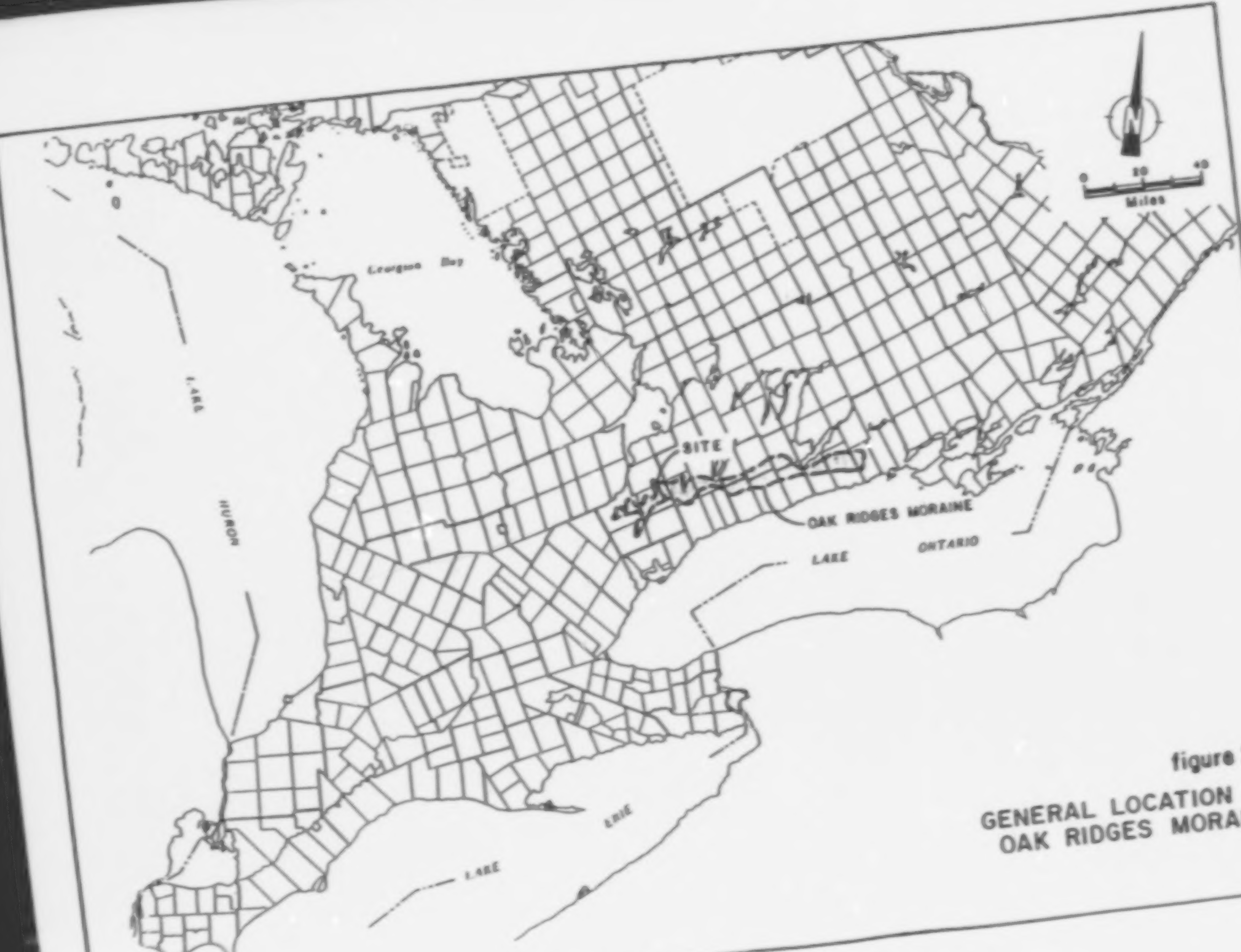

N
0 20 40
Miles
Georgian Bay
LAKE
HURON
SITE
OAK RIDGES MORAINE
LAKE ONTARIO
LAKE ERIE

figure 2.1

GENERAL LOCATION OF
OAK RIDGES MORAINE

after CRA

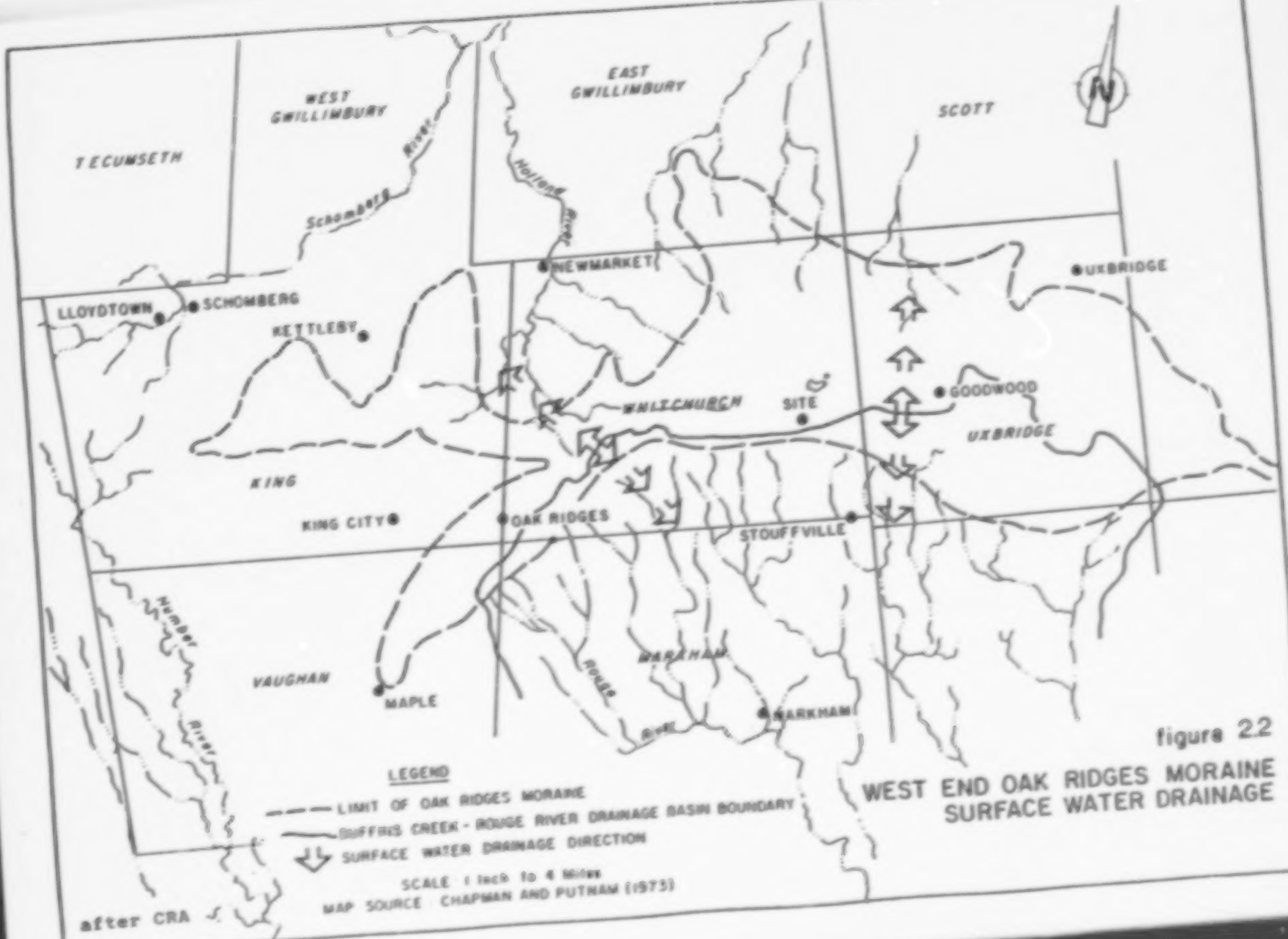

TECUMSETH
WEST GWILLIMBURY
EAST GWILLIMBURY
SCOTT
Schomberg River
Holland River
NEWMARKET
UXBRIDGE
LLOYDTOWN
SCHOMBERG
KETTLEBY
WHITCHURCH
SITE
GOODWOOD
UXBRIDGE
KING
KING CITY
OAK RIDGES
STOUFFVILLE
VAUGHAN
MAPLE
MARKHAM
MARKHAM
Rouge River
Humber River
LEGEND
LIMIT OF OAK RIDGES MORAINE
DUFFINS CREEK - ROUGE RIVER DRAINAGE BASIN BOUNDARY
SURFACE WATER DRAINAGE DIRECTION
SCALE 1 inch to 4 Miles
MAP SOURCE CHAPMAN AND PUTNAM (1973)
N

figure 22

WEST END OAK RIDGES MORAINE
SURFACE WATER DRAINAGE

after CRA

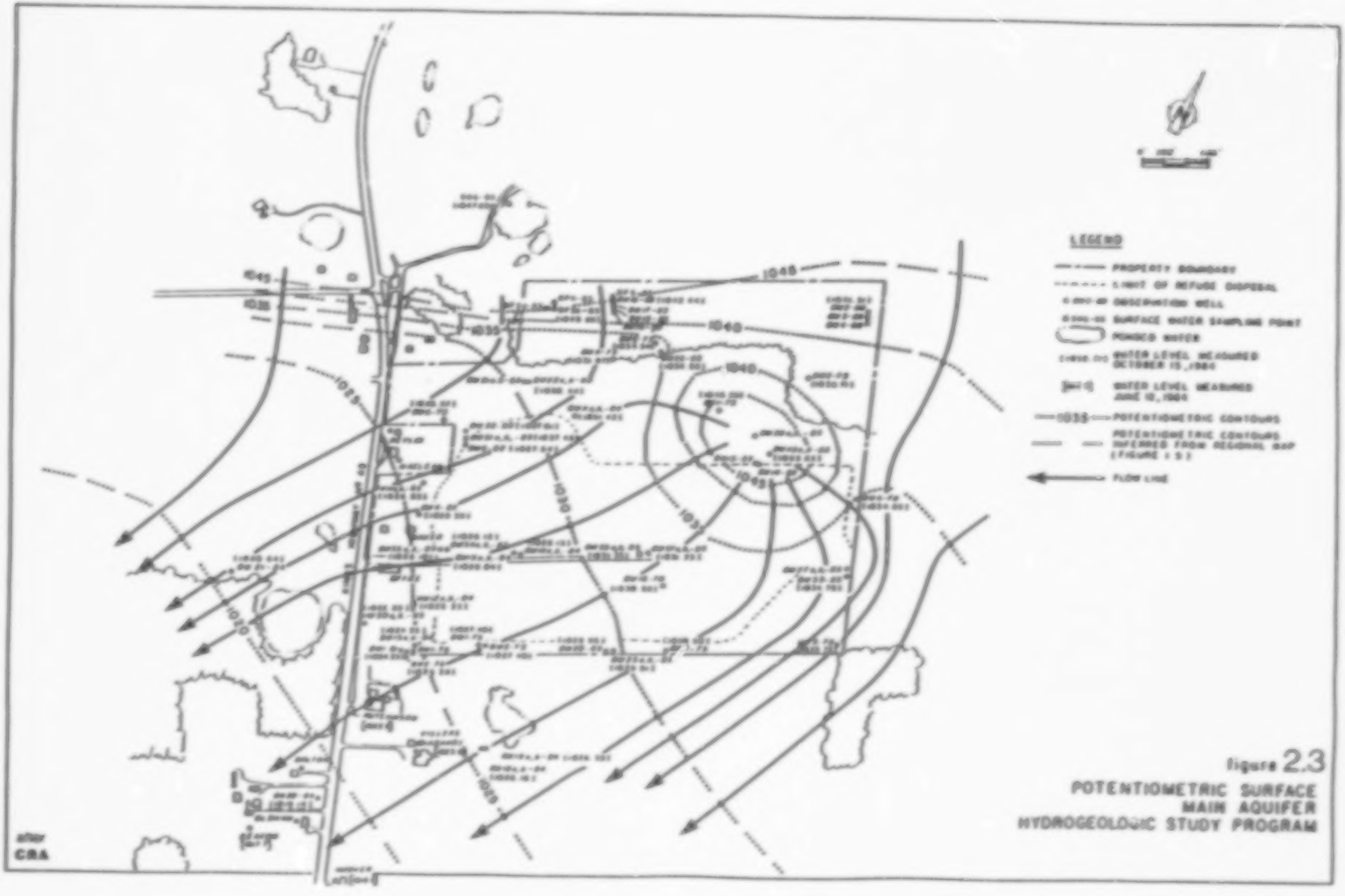

LEGEND
PROPERTY BOUNDARY
LIMIT OF REFUSE DISPOSAL
OBSERVATION WELL
SURFACE WATER SAMPLING POINT
PONDED WATER
WATER LEVEL MEASURED OCTOBER 15, 1984
WATER LEVEL MEASURED JUNE 12, 1984
1035 POTENTIOMETRIC CONTOURS
POTENTIOMETRIC CONTOURS INFERRED FROM REGIONAL MAP (FIGURE 1.3)
FLOW LINE
1045
1040
1035
1030
1025
1020
after CRA

figure 2.3

POTENTIOMETRIC SURFACE
MAIN AQUIFER
HYDROGEOLOGIC STUDY PROGRAM

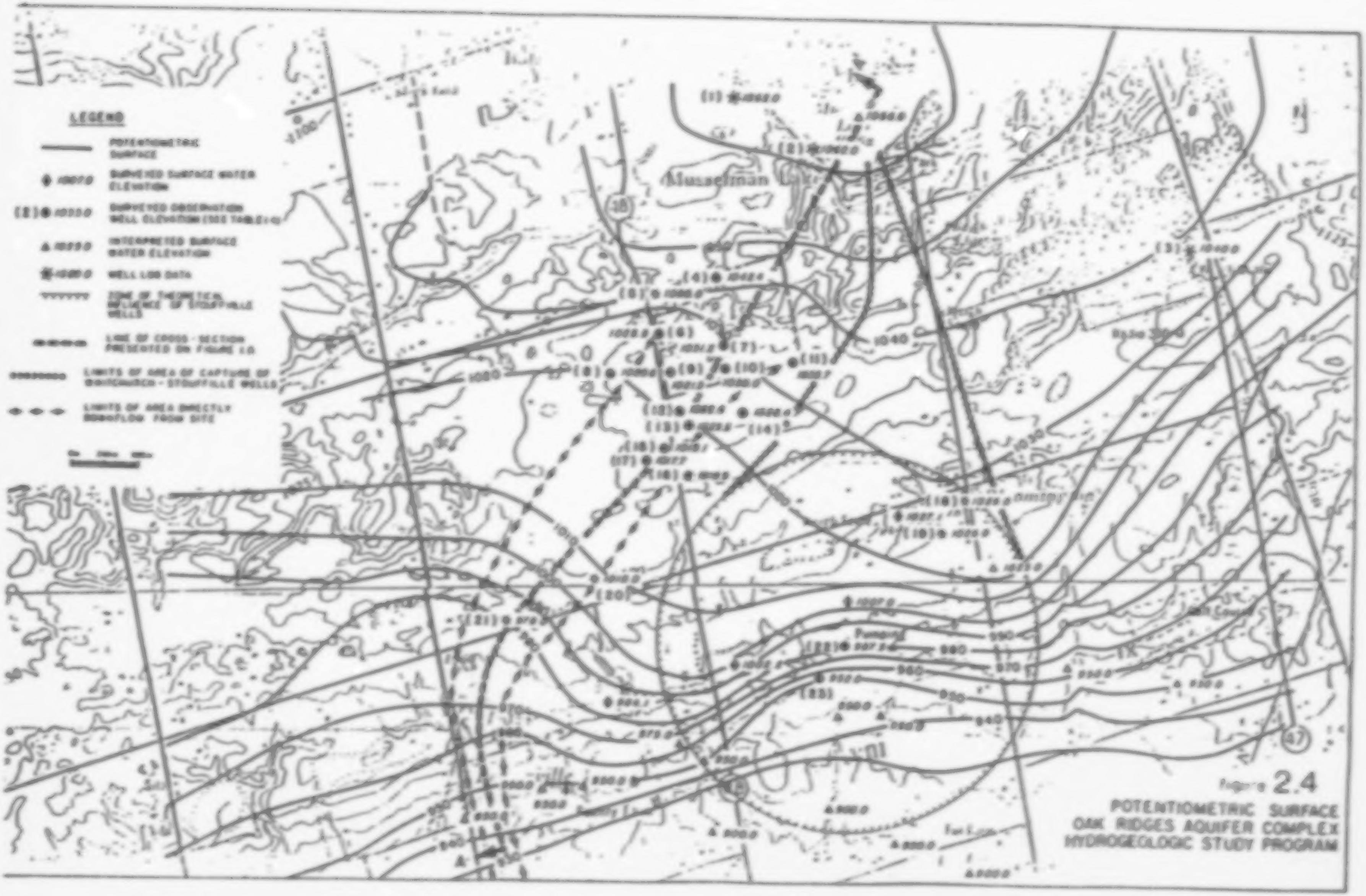

LEGEND
POTENTIOMETRIC SURFACE
SURVEYED SURFACE WATER ELEVATION
SURVEYED OBSERVATION WELL ELEVATION (SEE TABLE 2.1)
INTERPRETED SURFACE WATER ELEVATION
WELL LOG DATA
ZONE OF THEORETICAL INFLUENCE OF STOUFFVILLE WELLS
LINE OF CROSS-SECTION PRESENTED ON FIGURE 2.0
LIMITS OF AREA OF CAPTURE OF WHITCHURCH - STOUFFVILLE WELLS
LIMITS OF AREA DIRECTLY DOWNFLOW FROM SITE
Musselman Lake
1040
1030
1000
990
980
970
960
950
940
47

Figure 2.4

POTENTIOMETRIC SURFACE
OAK RIDGES AQUIFER COMPLEX
HYDROGEOLOGIC STUDY PROGRAM

after CRA

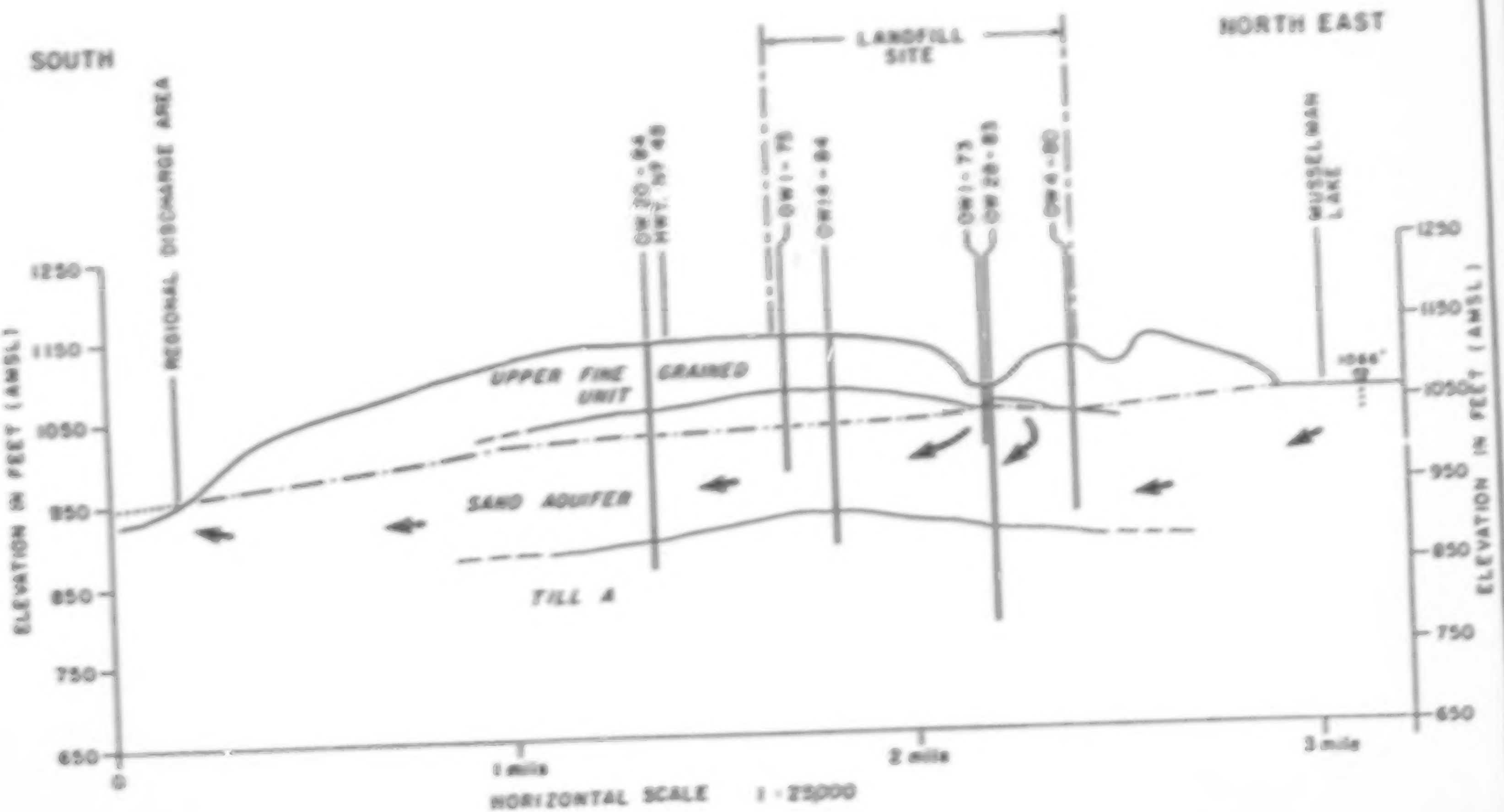
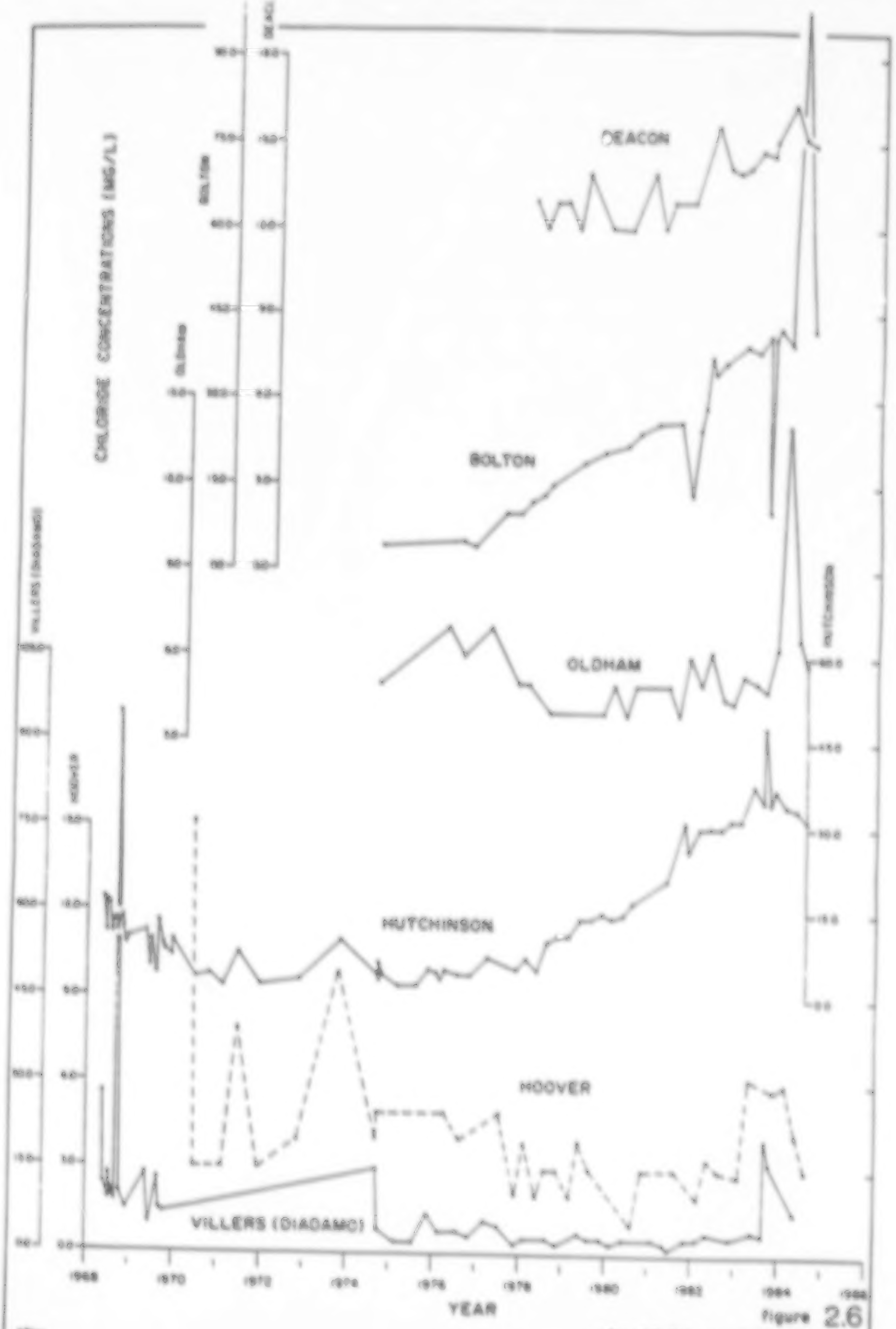

SOUTH
NORTH EAST
LANDFILL SITE
REGIONAL DISCHARGE AREA
OW 20 - 84
HWY. Nº 48
OW 1 - 75
OW 14 - 84
OW 1 - 73
OW 28 - 83
OW 4 - 80
MUSSELMAN LAKE
1066'
UPPER FINE GRAINED UNIT
SAND AQUIFER
TILL A
ELEVATION IN FEET (AMSL)
1250
1150
1050
950
850
750
650
0
1 mile
2 miles
3 mile
HORIZONTAL SCALE 1 : 25000

figure 2.5

SCHEMATIC CROSS - SECTION
OF ACTIVE FLOW SYSTEM

after CRA



after
CRA

figure 2.6

CHLORIDE CONCENTRATIONS
OFF-SITE OBSERVATION WELLS SOUTH OF WASTE

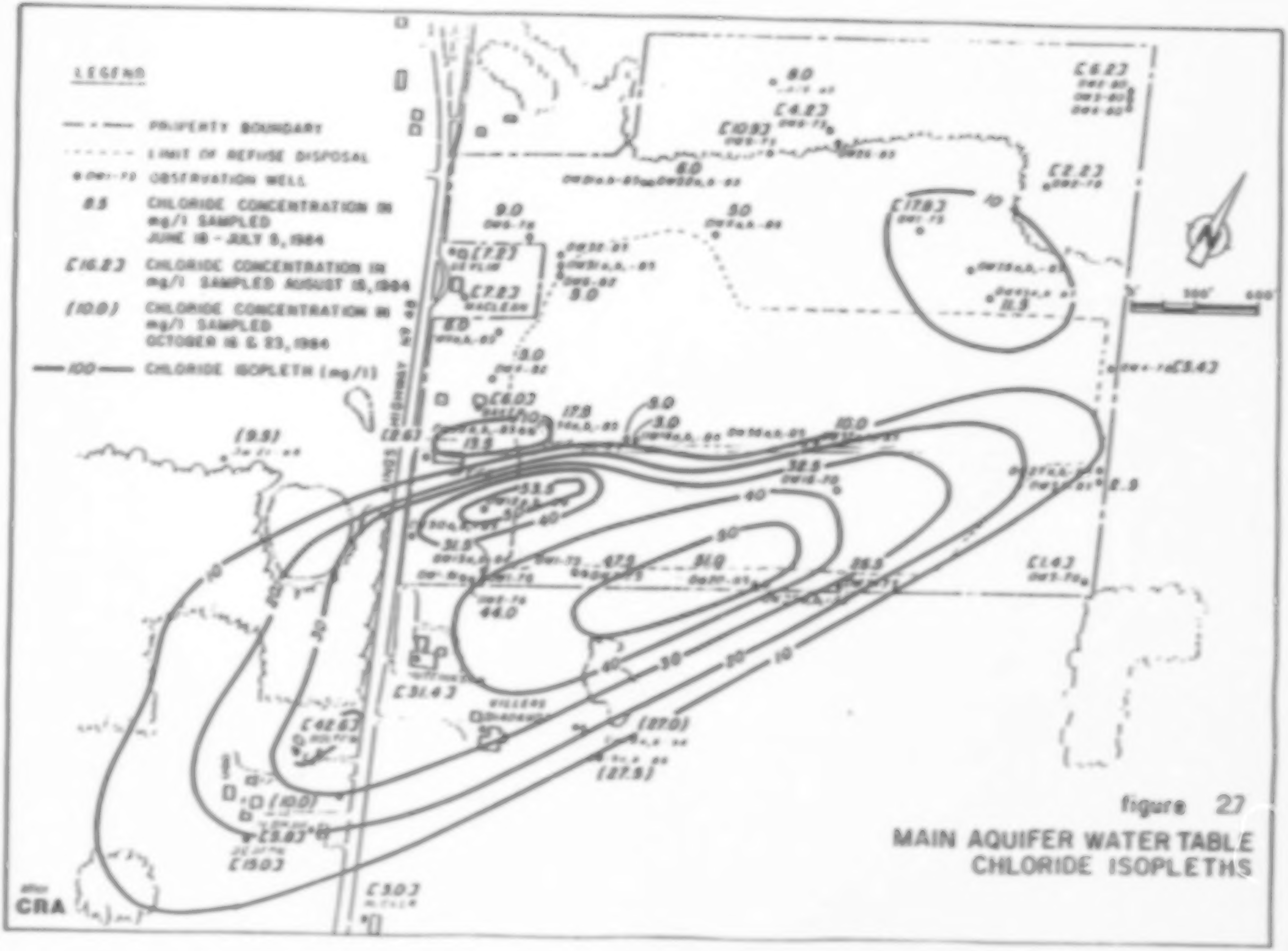

LEGEND
PROPERTY BOUNDARY
LIMIT OF REFUSE DISPOSAL
OBSERVATION WELL
8.5 CHLORIDE CONCENTRATION IN mg/l SAMPLED JUNE 18 - JULY 5, 1984
[16.2] CHLORIDE CONCENTRATION IN mg/l SAMPLED AUGUST 15, 1984
(10.0) CHLORIDE CONCENTRATION IN mg/l SAMPLED OCTOBER 16 & 23, 1984
—100— CHLORIDE ISOPLETH (mg/l)
HIGHWAY
10
20
30
40
50
60
53.5
47.0
51.0
44.0
32.5
26.5
17.8
[42.6]
[31.4]
(27.0)
(27.9)
[17.8]
[10.9]
[6.2]
[4.2]
[2.2]
[1.4]
[5.4]
[7.2]
[6.0]
[2.6]
[3.0]
[5.8]
[15.0]
(10.0)
(9.9)
0
300'
600'
after CRA

figure 27

MAIN AQUIFER WATER TABLE
CHLORIDE ISOPLETHS

section 3

3. DEVELOPMENT OF RISK MODEL

3.1 Objectives

The main objective of the epidemiological study is to determine if residents living in the vicinity of the landfill in particular, and in Whitchurch-Stouffville in general, are experiencing any adverse health effects from using groundwater which might have been contaminated as a result of waste disposal practices at the Stouffville landfill.

In order to achieve the above objective it was necessary to establish a framework on which to build a sampling program. This framework sought to break down the area into a number of zones defining the potential exposure of residents to contaminants from the landfill through the use of groundwater. The criteria used for this task are detailed below but, in summary, it involved looking at groundwater flow directions in the shallow and deep systems and at the results of the chemical sampling carried out over the years.

3.2 Theory

In the previous sections of this report the hydrogeology and groundwater quality were discussed and it was seen that leachate of variable chemistry was present beneath the site. It was further seen that pulses of contaminated water had apparently moved down gradient in the regional aquifer and that, based on analyses for conservative parameters such as chloride, these had some impact on wells which were being monitored.

Extensive testing for hazardous substances in the domestic wells did not reveal any overall pattern of contamination and, in general, the contaminants which were found were in relatively low concentrations.

It is known that, prior to 1970, large amounts of liquid waste were disposed of at the site and, though some contaminants were found on site in the subsequent investigations, these probably account for only a fraction of the quantities that originally went into the lagoons. Thus the fate of the liquid wastes becomes a matter of conjecture.

It could be argued that these have been retained within the site and that, up to the time of the most recent investigations, they had not been released in significant quantities. If this was the case, however, then it might reasonably have been expected that larger quantities would have been encountered during the investigations. Similarly the reports that at least one of the lagoons, when filled with liquids, would have emptied by the next day suggests that the liquids were not being retained in the upper fine-grained deposits.

An alternative to the theory that the liquids were retained within the site is that they moved rapidly into the regional aquifer and passed through the system without detection. This theory assumes that when comprehensive monitoring and analysis were eventually implemented then the bulk of the organic contaminants from the liquid waste disposal practices had long since passed through the system. Thus domestic wells down-gradient might, at some time, have been exposed to pollution arising from the disposal of liquid wastes but that the risk has now passed.

A third scenario is that the liquids have been gradually moving away over the years and that the attenuation processes such as dispersion, diffusion, dilution and retention on soil particles, have rendered them undetectable down-gradient of the site.

Whichever theory is considered, however, the method of identifying the exposure zones is the same, and is based on the shallow and deep groundwater flow patterns.

3.3 Method

The first step in determining the exposure zones was to identify the area within which the residents would have had the greatest potential exposure to contaminants which might have moved off site by transport in the groundwater system. The area thus identified was designated as Zone A.

This present review of the earlier work has not suggested that the conclusions with regard to groundwater flow are in error. However, it was considered prudent to include a safety factor in establishing the framework for the sampling program. A safety factor, moreover, which would hopefully take into account some of the concerns of the local citizens. Thus an intermediate zone, or Zone B, was established within which wells might have been exposed to contaminants in the unlikely event that the hydrogeological model arising out of the extensive studies at this site should, in fact, be seriously in error.

With regard to Zone A, based on the existing knowledge of the site, it seems likely that any liquids which did not move downward from the shallow perched groundwater systems into the regional aquifer would have moved laterally northward into the swampy area north of the site. In addition a small component may have moved southward. In total, however, the extent of movement in the shallow sub-surface environment is likely to have been limited, with the water soon appearing at the surface. Thus the boundary of Zone A in these areas is relatively close to the site (see Figure 3.1).

Lagoon 1, at the eastern end of the site, is known to have overflowed onto the adjoining property in the past thus, probably, carrying contaminants which would then infiltrate into the sub-surface. The extent of this overland flow was limited and the affected area has been included in Zone A.

Any contaminants which reached the deep regional aquifer will most probably have moved to the south or west, in the general direction of groundwater flow. It is possible that there is some movement off-site to the east as a result of the groundwater mound described earlier. However, this mound represents only a local variation superimposed on a regional flow system and its effect will have been limited. Thus, though some groundwater may flow eastward from the mound, it will not travel far before it is influenced by the regional trend and starts to move towards the southwest. The limited easterly movement has been taken into account in defining Zone A.

Zone B, the intermediate zone, is based on less specific data and, as explained above, can be said to include those areas in the general vicinity of the landfill which could conceivably have been exposed to groundwater originating beneath the site if the theories about the groundwater movement are, in fact, inaccurate when considered in detail.

Conclusions with regard to hydrogeology in general, and groundwater and contaminant movement in particular, are based on interpolation and extrapolation from variously spaced data points. It is extremely difficult to be completely certain of the accuracy of the conclusions, given the problems of collecting adequate amounts of data. This is particularly so in areas such as the Oak Ridges Moraine, where the surficial geology is relatively complex. The inclusion of Zone B in the sampling model, therefore, reflects any variations from the postulated flow pattern upon which Zone A is based.

The earlier studies indicate that Musselman Lake is a groundwater recharge zone and, with an elevation higher than the main water table beneath the landfill, it is difficult to conceive of groundwater within the vicinity of the lake becoming contaminated by leachate. In order to take into account the local concerns with regard to this possibility, however, Zone B was extended to include lake frontage on the side closest to the landfill. It was assumed that, in the unlikely event of contaminated groundwater flowing from the landfill towards the lake, it would not reach the groundwater users on the far side if the lake was a groundwater discharge zone. This is because flow would be radially in, towards the lake, from all sides. If the lake was a groundwater recharge zone then flow would be away from the lake.

The remaining areas of Whitchurch-Stouffville were then considered as a third zone for comparison purposes. Thus the epidemiological study could compare the results of the survey of the health of residents in the first two areas with the results for the rest of Whitchurch-Stouffville.

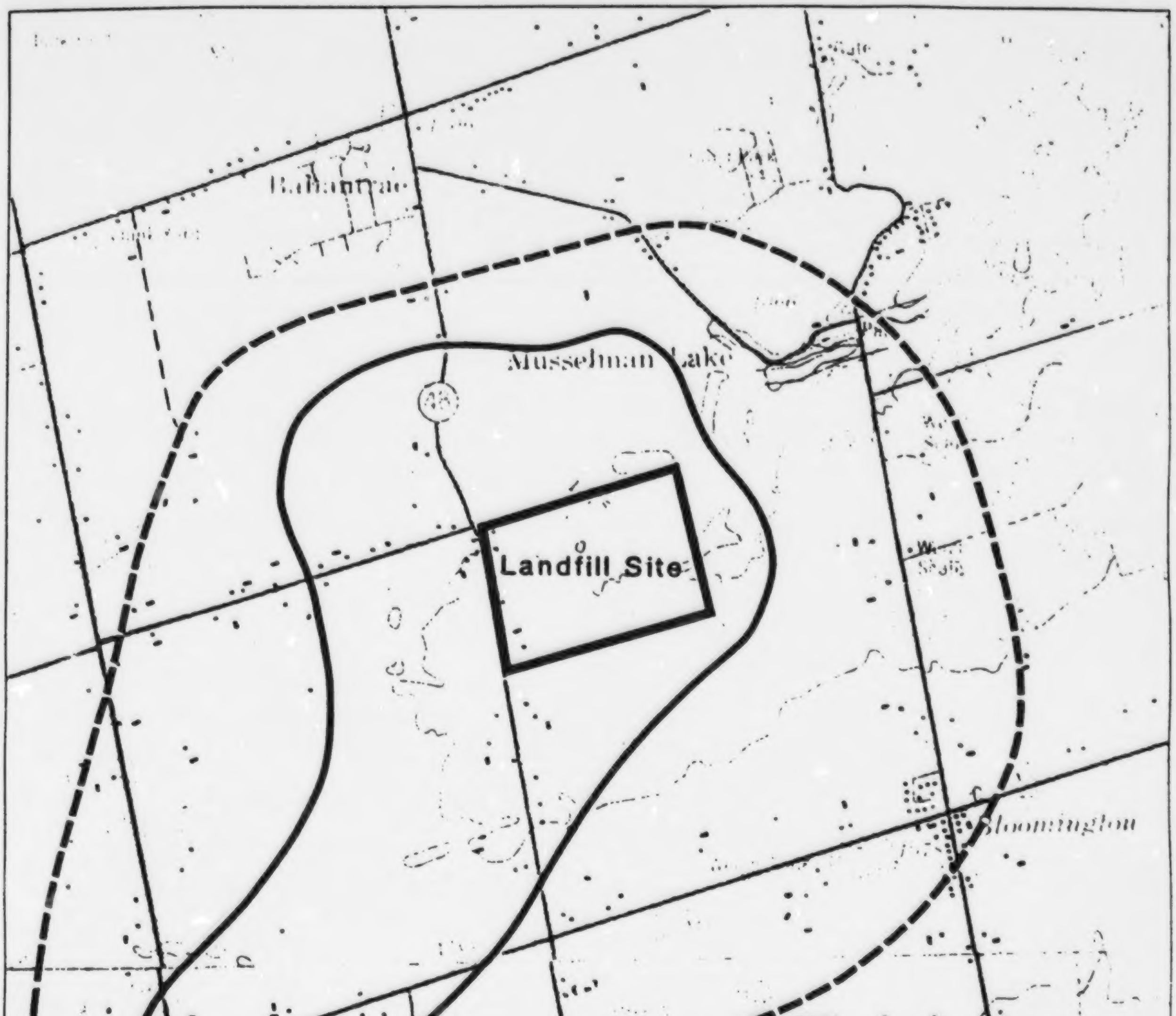

Ballantrae
Musselman Lake
48
Landfill Site
Bloomington
Pumping Station
Conveyor
Lemonville
0
1 Miles
0
1 Kilometres
Zone A
Zone B

Figure 3.1

Potential Exposure Zones

MacLaren Plansearch

section 4

4. CONTROL AREAS

4.1 Background

Two nearby townships were selected as control areas for the epidemiological study. The two areas were to be demographically comparable but with different potential risks of contamination from landfill sites. East Gwillimbury was selected as an area with a landfill site with no apparent contamination of drinking water and Tecumseth was selected as an area with no landfill sites.

MacLaren Plansearch reviewed the geology and hydrogeology of the two control areas to ensure that, in general terms, they were comparable to Whitchurch-Stouffville. The location of the three areas are shown on Figure 4.1.

4.2 Tecumseth

Tecumseth was selected as the control area with no landfill. The Township is located to the northwest of Whitchurch-Stouffville and, in contrast to the latter, most of the surface drainage in Tecumseth flows to the north. The regional divide lies to the south of the Township and part of the Oak Ridges moraine underlies the southwest corner. This is the higher area and, moving northward, the deposits of the Oak Ridges moraine give way to a thick sequence of clayey to sandy glacial tills which, in low lying areas are overlain by lacustrine sands and clays.

The only licenced landfill in Tecumseth is a small site of some 1.5 hectares located in the northwest quadrant of Lot 3, Concession 6.

The small size of the operation, the limited extent of groundwater movement from beneath the site and the absence of down-gradient users mean that the landfill does not pose a risk to any local residents. Thus it was concluded that Tecumseth Township could serve as the control area with no landfill.

4.3 East Gwillimbury

East Gwillimbury was selected as the control area with a landfill site. The town is situated mainly to the north of the Oak Ridges moraine and only a small part, along the southern boundary, is actually underlain by the moraine itself. The clay plain found in the northwest corner of Whitchurch-Stouffville extends into East Gwillembury but most of the town is located on a drumlinized till plain, with the till tending to be somewhat sandy.

The existence of a large landfill in East Gwillembury, combined with the sequence of thick glacial deposits, makes it an acceptable control area for the epidemiological study.

HEALTH STUDY COMMUNITIES

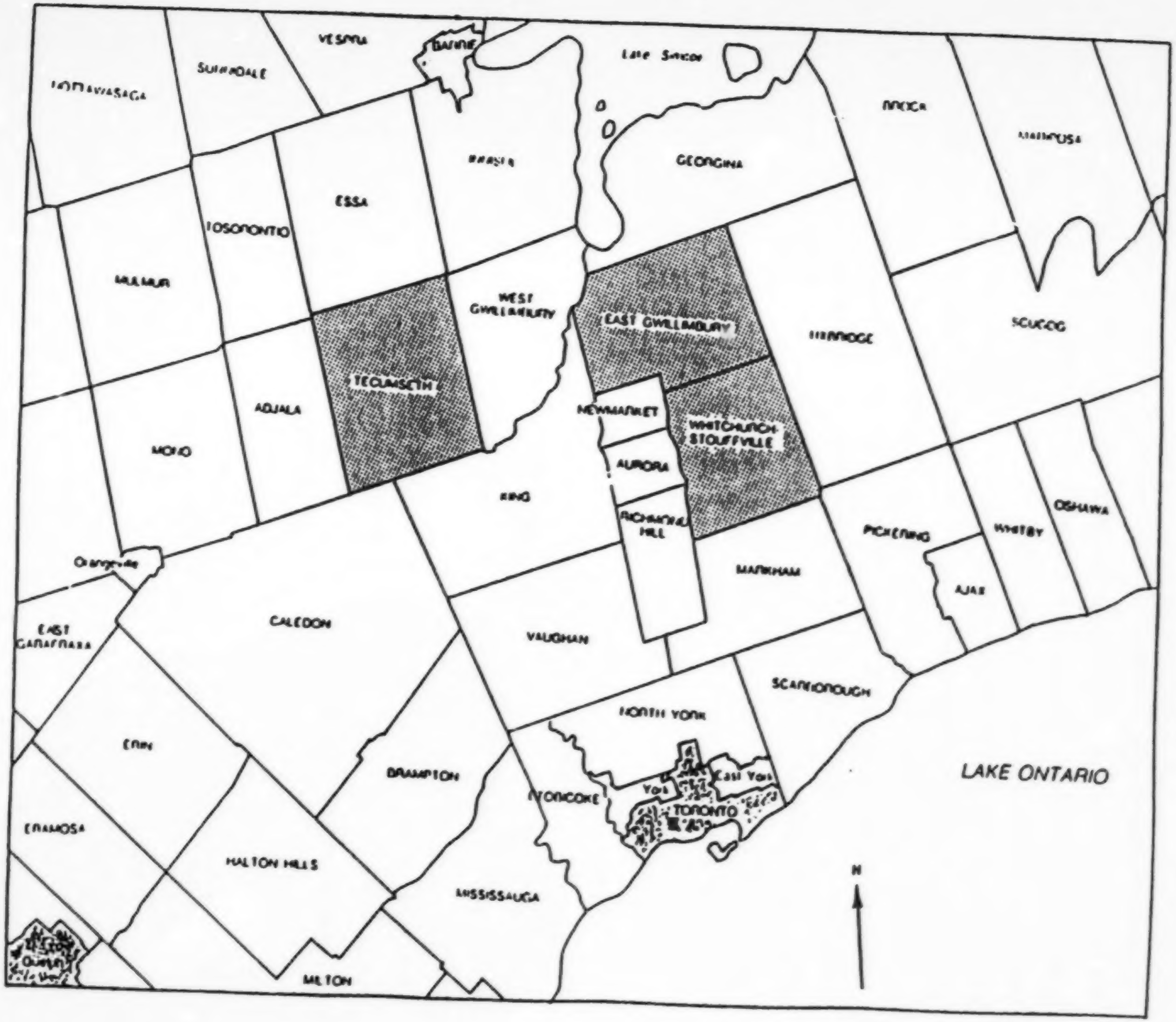

NOTTAWASAGA
SUNNIDALE
VESPRA
BARRIE
Lake Simcoe
BROCK
MARIPOSA
INNISFIL
GEORGINA
ESSA
TOSORONTIO
MULMUR
WEST GWILLIMBURY
EAST GWILLIMBURY
UXBRIDGE
SCUGOG
TECUMSETH
ADJALA
MONO
NEWMARKET
WHITCHURCH-STOUFFVILLE
AURORA
KING
RICHMOND HILL
PICKERING
WHITBY
OSHAWA
Orangeville
MARKHAM
AJAX
EAST GARAFRAXA
CALEDON
VAUGHAN
SCARBOROUGH
NORTH YORK
ERIN
BRAMPTON
ETOBICOKE
York
East York
TORONTO
LAKE ONTARIO
ERAMOSA
HALTON HILLS
MISSISSAUGA
Guelph
MILTON
N

Figure 4.1

bibliography

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APPENDIX E: DATA COLLECTION AND QUALITY ASSURANCE METHODS

APPENDIX E: DATA COLLECTION AND QUALITY ASSURANCE METHODS

This Appendix highlights the methods and activities used in the study to collect the required information (i.e., from the health survey and population-based registry statistics), how the methods were implemented, and what quality assurance procedures were integrated into the study to ensure "optimal" quality of data in every stage.

E.1 SURVEY

E.1.1 Activities Prior to Data Collection

Prior to the actual fieldwork or data collection stage of the study, a number of related activities were employed to ensure that a high quality survey would result. For example, a major issue for survey methodologists in undertakings of this nature is how to adequately control inherent non-sampling errors such as low response rates, falsified answers, interviewer bias, etc., which may seriously bias the survey results. The only methodological "solution" currently used to address such issues is to **meticulously** plan, design, develop, implement, process, analyse, interpret and report each individual survey activity in such a way that a high quality survey product is very likely.

Therefore, in this regard, the list of activities highlighted below and those which follow can be thought of as mainstays of this methodological effort to maximize the data quality:

- **detailed project planning**, particularly the main survey components of: **design** (e.g., sampling allocation schemes; telephone/in-home interview; medical records review and blood sampling program with interview questionnaire survey; compilation of mortality and morbidity statistics); **development** (e.g., modular construction of the interview questionnaire from existing instruments); **implementation** (e.g., form letters, consent forms, and extensive logistics controls - including the use of a local site office in WS; special direct long-distance telephone lines for convenient handling of resident enquiries; and, regular press releases); **processing** (e.g., primarily, computerized using SPSS-X interface); **analysis** (e.g., following epidemiologic principles of analysis); **interpretation and reporting** (e.g., use of internal and external expert reviewers);

- **public review** of study plan - for example, the survey questionnaire, medical records review, and blood sampling protocols were reviewed by the study team's Advisory Committees (including the Technical Advisory Committee and the WS Citizens Advisory Group - see Appendix A). In addition, the study protocols (e.g., involving the means for ensuring confidentiality of all collected data) were reviewed and fully approved from a formal Ethics Committee perspective. Formal presentations, relating the study objectives, approach, expected outputs, operational protocols, public relations, etc., were also given to several groups, including:

    - Whitchurch-Stouffville Town Council representatives;
    - East Gwillimbury Town Council representatives;
    - Tecumseth (including Tottenham and Beeton) Town Council representatives;
    - Whitchurch-Stouffville general public meeting;
    - Concerned Citizens of Whitchurch-Stouffville; and,
    - Whitchurch-Stouffville high school classes;

- **sampling frame specifications** were documented in detail (and subsequently, computerized) as part of the correspondence/liaison with the source of such data, the Ministry of Revenue;

- **selection of samples** was fully automated using an offline microcomputer - mainframe (University of Ottawa) linkage, and followed a tailored, documented two-level design specification plan for addressing the study's objectives/research questions;

- **questionnaire development** was founded on the use of existing, well-tested instruments, where the overall integrating rationale, format and structure followed the much-used Canada Health Survey design. In addition, sound methodological principles of questionnaire design were emphasized in all phases of the questionnaire development process. For example, these included:

the extensive use of direct, properly time referenced/contexted, single, idea, closed questions throughout the questionnaire; use of simple, short skip (filter) questions when required; the placement of non-threatening questions at the beginning of the questionnaire, with the most relevant questions near the beginning (health status/problems and pregnancy outcomes); straightforward (interviewer) instructions (e.g., coloured reference cards for month codes; age calculations; etc.) for executing all aspects of the questionnaire, particularly for handling introductions, refusals, proxy reporting, telephone/in-home interviewing, special coding (such as large families, many reported health problems, etc.); and, thorough pre-testing of the complete questionnaire package, which encompassed criteria on content (language, information level, relevancy), flow of questions, timeliness, and quality of response (e.g., elimination of leading questions/probes; minimizing measurement and non-response problems);

- **field personnel** used in the study were chosen with great care (e.g., of some forty applications, 15 were selected for interviewer/nurse research assistant positions), according to pre-determined, uniform criteria (e.g., experienced; motivated; personable; resident outside study areas; pass written-screening test on survey coding; etc.). Intense training sessions followed the recruitment phase, and were led by experienced trainers of interviewing techniques. For example, these sessions covered 3-4 days of detailed materials (emphasizing the Interview Questionnaire and the Interviewer's Instruction Manual), and culminated in several (rated) practice-interviews with selected "respondents";

- **advice and direction from the study's Advisory Committee** at various stages of design and implementation also proved to be a main source of input for ensuring the utmost effort was made to achieve high quality survey outputs; and,

- **the confidentiality and security protocols/systems** used in the study were an integral part of all phases of activity. For example, all information from the interviews, medical records, and blood tests were restricted to only the core team members of the research team (4 in all). Code numbers were used to identify all respondents, and the corresponding name/address information were kept separate in a secure file at all times. All identifying information will be destroyed at the completion of the study. Only statistical summaries will be published.

E.1.2 Data Collection

Following the detailed planning and survey preparatory activities described above, the data collection program began on April 9, 1986 - encompassing the contacting and interviewing of about 2000 resident householders including institutional residents, or about 6000 people; the preparation and processing of about 800 eligible medical record reviews; and, the taking of about 500 blood speciments from the designated resident populations - and, ended on July 4, 1986. The twelve-week, intensive collection effort was designed in similar fashion as described above for the pre-data collection activities. The main highlights of the data collection from the above perspective are listed below:

- **start-up period monitoring and feedback** - it has been found with survey undertakings of this nature, that the first two weeks of operations are critical to the subsequent quality of the survey itself, thus, the designation "start-up" period. A number of strict, monitoring and feedback procedures were implemented during this time period to ensure utmost consistency and thoroughness of questionnaire implementation among all interviewers. For example, a relatively slow, staggered start - which gave each interviewer lots of supervisory attention - was used to gradually (over one week) bring the entire complement of interviewers into full operation involving the blind-telephone interviewing technique (i.e., where the "first-line" telephone interviewer places the initial call and introductory contact, then passes the respondent to a "second-line" telephone interviewer, who then continues the detailed interview not knowing ("blinded" to) the identity and location of the respondent). For each interviewer, the interviews themselves were equally proportioned or "balanced" by the site supervisor across the three main study areas to spread any start-up "learning-curve" biases equally across the areas. A typical interview averaged about 30 minutes. The average ratio of supervisory staff to interviewers during this period was 1:1.5. Continuous training-on-the-spot, for individual interviewers and small groups of interviewers, was conducted during this period to ensure that every possible situation was documented in the Interviewer's Manual and uniformly handled by all interviewers. In this manner, all decision-making related to the Interview Questionnaire was standardized and available for analysis at any time by the study's design/analysis team;

- **continuing period after start-up** - after the first two to three weeks of start-up, a more, periodic monitoring and supervisory feedback process was used. For example, all completed telephone questionnaires were reviewed by the person on first-line who had set them up. Any errors were corrected and brought to the attention of the interviewer and supervisor - usually within 30 minutes of the interview completion. All completed telephone or in-home interview questionnaires were reviewed by a supervisor within one day of the completion. Some interviews were not made until about fifteen calls at varying times and days of the week had been placed. Any mistakes or inconsistencies noted were corrected, after consultation with the interviewer. Ad hoc observations or checks by site supervisors were also used in conjunction with daily log sheets produced by each first-line interviewer (these sheets highlighted the respective volumes of telephone and in-home appointments, consents, completions, refusals, replacements, and special problems attributed to each interviewer over the two daily shifts). At the peak of the study's collection period, the supervisor-interviewer ratio was 1:12. Interviewers were continuously assessed in terms of their motivation, preferences, and interviewing/coding talents - and adjustments were made between the first and second-line interviewing roles to ensure the utmost quality of data output. Interviews themselves were scheduled over the morning, afternoon, and evening - for every day of the week except Sunday;

- quality and its important role in all phases of the interviewing tasks - particularly, with respect to minimizing non-response/refusals - was emphasized repeatedly throughout the entire data collection effort; for example, daily volumes of completed and refused interviews were posted in the interviewers' room;

- difficult situations (e.g., involving respondent complaints on any matter, which occurred in less than 10 occasions) were handled directly by the site supervisors, the project administrator, or the project director. A telephone log book was used to record all incoming calls from residents, so as to have the entire team made sensitive to ongoing issues/concerns. A few interviews were conducted in Italian to accommodate strictly Italian-speaking residents;

- a small number of re-interviews of residents was carried out by the site supervisors; no discrepancies were found;

- the blood analyses by MDS Laboratories were carried out concurrently with the collection effort; the respondents' physicians/local Medical Officer of Health were informed of any elevated blood results (as judged by MDS medical staff);

- all those residents who could not be reached by phone were pursued by home interviews. The most experienced interviewers were assigned to home interviews. A great deal of effort was made to locate addresses, including looking at assessment maps on microfiche, interviewing local officials (e.g., town planners), and including the hand-drawing of detailed maps;

- response/non-response rates per design area (WS, EG, Tec, WS-A, WS-B, WS-C) were frequently monitored, and more effort was put into increasing responses in various towns and townships in order to even up the rates. Extra effort was made to get all possible (pre-selected sampled) responses from those residents living in WS sub-areas A and B (this effort included all three collection programs: Interview Questionnaire, Medical Records Review, and Blood Sampling); and,

- periodic reviews and analysis of completed questions - in terms of interviewers' coding accuracy and respondent non-response/response biases - in addition to ongoing analyses of replacements (type/rate), refusals (type/rate), and any ad hoc problems, were conducted by the project administrator/director and members of the Advisory Committee. The Project Administrator/Director were always available at the head office for phone consultation. The site supervisors and Project Administrator/Director spoke to residents in person or by phone wheneven necessary.

E.1.3 Activities After Data Collection

For this stage of collection the highlights below focus on the questionnaire processing and quality assurance procedures used in the study:

- all completed questionnaires were manually re-edited, and rectified if necessary, by the site supervisors before the computerization stage of questionnaire processing;

- a number of additional systematic checking, coding, and editing steps were also performed by the team of interviewers under the supervision of the site supervisors (e.g., occupational coding; open-ended question coding; certain between-question (correlation) checks); all such operations were carried out with pre-determined specifications and procedures;

- special coding was carried out for:

  (i) medical records reviews - nurse supervisors reviewed (and rectified if necessary) all completed forms by nursing research assistants);

(ii) long-term health problems - the International Classification of Diseases (9th Revision) was used to code the self-reported cancer and other chronic health information obtained from the respondents. The specialized cancer coding was done by the nurse-site supervisor and the team epidemiologist. This coding assignment was reviewed by Advisory Committee experts. All responses for the open-ended question were collapsed into a small set of similar responses using the Canada Health Survey approach of empirically-defined ("rolling") codes. Verification by medical records review was carried out for selected reported, long-term problems based on pre-determined criteria;

(iii) congenital defects/reproductive outcomes - all self-reported, open-ended responses for birth anomalies were coded following the ICD9 - by the same team members as noted above. Coding outcomes were empirically-defined using "rolling" codes. The Advisory Committee experts reviewed the decisions and analyses of this activity. Verification by medical records review was carried out for all reported adverse reproductive outcomes;

- computerization of the collected data sets (Interview Questionnaires; Medical Record Coding Sheets; Blood Sample Analysis Transmittal Forms; see Appendices C and F) involved 100% key-verification (e.g., each questionnaire was entered twice - by different operators - to reduce the possibility of typographical errors), and included both automated validation (range checks for one-item response) and correlation (consistency checks for between-item responses) edit checks performed using the SPSS-X statistical package. Any errors/inconsistencies were manually rectified by the team methodology experts. All edit, coding, and other changes to the original collected data were carefully documented and analyzed for consistency, completeness, and relevancy in terms of the subsequent results. About 150 changes to the original data resulted from the over-500 checks for validity/consistency encompassing nearly 6000 individuals and 130 questions per individual. Most of the changes were minor in nature, the result of resolving conflicting responses - for example, where information which was missing from one question could be explicitly derived from other responses; and,

- computerized tabulation runs were produced, highlighting the self-reported frequency distributions across the study areas (main areas: WS, EG, Tec and WS sub-areas A,B,C), using the SPSS-X statistical package on the University of Ottawa computer. Many tabular and graphical displays were generated to explore/address the study's research questions, issues and hypotheses.

E.2 MORTALITY AND MORBIDITY STATISTICS

Direct contact was made with the respective experts representing the following mortality and morbidity statistical databases:

- Mortality Data: Statistics Canada
  Vital Statistics Section, Ottawa;

- Morbidity Data - Reproductive Outcomes/Birth Defects Data:
  Congenital Anomalies Surveillance System (CASS), Ontario (Ministry of Health);

- Morbidity Data - Cancer Incidence Data:
  Ontario Cancer Treatment and Research Foundation, Toronto.

In each instance, several meetings took place to refine the specific requirements for the purposes of the study. Then, formal data specifications were drawn up by the team's epidemiologist, from which the explicit data extractions followed.

The study team statistican and epidemiologists, in conjunction with the Advisory Committee, analyzed the statistical output data for WS, EG and Tec, and formulated either additional data analysis requirements, or sought further technical assistance from the database producer(s). Preliminary results and conclusions were also briefly discussed before the final results and conclusions were documented.

APPENDIX F: OTHER RELEVANT DOCUMENTS

- MURDIE REPORT TO MINISTRY OF HEALTH (1985)
- MDS LABS REPORTING FORM
- MEDICAL RECORDS REVIEW (MRR) FORM USED BY TEAM NURSES IN REVIEW OF MEDICAL RECORDS
- LETTER SENT TO HOSPITALS TO OBTAIN PERMISSION TO HAVE ACCESS TO PATIENT MEDICAL RECORDS
- LETTER SENT TO PHYSICIANS TO REQUEST ACCESS TO PATIENT MEDICAL RECORDS

Recommendations to the Ministry of Health, Province of Ontario, on Areas in South - Central Ontario Considered to be Most Demographically Similar to Whitchurch-Stouffville

in preparation for

A COMMUNITY HEALTH STUDY OF THE RESIDENTS OF WHITCHURCH-STOUFFVILLE

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Department of Geography
York University

July, 1985

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Appendix A

Maps Showing the Location of Census Consolidated Subdivisions in South-Central Ontario

1. Introduction

This report is a brief explanation of the data and methods used, the results obtained and recommendations concerning the selection of potential comparison areas in South-Central Ontario that are demographically comparable to the Town of Whitchurch-Stouffville.

2. Data Sources and Research Methodology

2.1 Variable Selection

Evaluation of demographic similarity was based on eight variables from the 1981 Census of Canada selected in consultation with Drs. Smith and Spielberg. These represented a range of demographic characteristics including age structure, income, educational achievement, occupational status, ethnicity and length of residence (Table 1).

2.2 Spatial Units of Analysis

The index area of Whitchurch-Stouffville corresponds spatially to a census consolidated subdivision. The latter is a geographically contiguous group of census subdivisions (e.g., city, town, township, village).

In Ontario, census consolidated subdivisions generally correspond to townships and include both the rural and urban areas within each township. Large cities such as Kitchener, Barrie and Oshawa are defined as separate census consolidated subdivisions. (Appendix A). Unlike census tracts, census consolidated subdivisions vary dramatically in population size but have the advantage of relative spatial compactness and, for this analysis, exact correspondence spatially with the index area. For these reasons it was decided in this study to use census consolidated subdivisions as the spatial unit of analysis.

2.3 Geographic Coverage

The search space for comparison sites was restricted to a region that can generally be described as South-Central Ontario. This region includes all census consolidated subdivisions lying roughly within 125 km. of the index area (Figure 1). Selection of the search space was somewhat arbitrary although: (1) it was assumed from general knowledge of Ontario's demographic structure that suitable comparison areas would be found within the rural-urban fringe of the Oshawa to Hamilton axis and, (2) it was deemed desirable by the Ministry of Health to identify potential comparison areas as close as possible to Whitchurch-Stouffville to facilitate the field portion of the health survey. Counting the index area, 139 census consolidated subdivisions were included in the analysis.

2.4 Demographic Similarity

Evaluation of demographic similarity was based on two separate analyses. The first incorporated the eight variables from Table 1 in their original form while the second was based on the results from a factor analysis of the eight variables. Neither analysis is better than the other although it is expected that the results will be similar. Each is used to confirm the other. Indeed, if the results were radically different there would be cause for concern.

The first analysis avoids the interpretive problems of a complex multivariate statistical technique such as factor analysis, but does not take into account the potential overlap between variables. For example, in this study the correlation between educational achievement (SOME UNIV) and high status occupation (MMANPROF) was .89. Factor analysis is a standard statistical procedure that is designed to sort out these interrelationships between variables. Essentially, the variables are grouped into summary factors on the basis of their interrelationships. Each factor summarizes a distinctive or statistically independent portion of the social geography of South - Central Ontario.

Four major factors that accounted for approximately 90 per cent of the common variance in the original eight variables were identified using principal components analysis with varimax rotation. Together, these factors summarized the following features of South Central Ontario's social geography in 1981:

1. Economic Status: educational achievement, occupational status and income
2. Family Status (Life Cycle Stage): age and length of occupance
3. Rural-Urban Contrast: farm population and length of occupance
4. Ethnic Status: Anglo Saxon (British) ethnicity

Factor loadings showing the correlations of the eight original variables with the four new factors are shown in Table 2. In addition to the factor loadings, standardized scores were obtained for each census consolidated subdivision on each of the four factors.

As a means of measuring demographic similarity squared distances (Euclidian distance measures) between Whitchurch - Stouffville and every other census consolidated subdivision were computed using: (1) the eight original variables, and (2) scores from the four factors.

This is a standard procedure in taxonomic analysis. In effect, these are measures of social distance between census consolidated subdivisions. The smaller the value, the more similar the census consolidated subdivision is to Whitchurch-Stouffville. It should be noted that the similarity score is a descriptive measure for which there is no test of statistical significance.

For each analysis the 20 census consolidated subdivisions most similar to Whitchurch-Stouffville were rank ordered by score (from lowest to highest). The details are presented in Tables 3 and 4. When the two rank ordered lists were compared, 16 of the 20 census consolidated subdivisions were found to be common to both. Of the 10 most similar census consolidated subdivisions, 8 were common to both lists. Thus, as anticipated earlier, results from the two analyses were similar. As a means of obtaining a final summary measure the two rank scores for each census consolidated subdivision were summed (Table 5). These sums were in turn rank ordered to produce a list of most similar census consolidated subdivisions. Finally, as an aid to evaluating potential comparison areas, values for the eight variables and scores on the four factors were summarized in Table 6 for the twelve most similar census consolidated subdivisions.

2.5 Characteristics of Whitchurch-Stouffville

It will be noticed from Table 6 that Whitchurch - Stouffville is about average for all characteristics except those summarizing economic status. Compared to other census consolidated subdivisions included in the analysis, Whitchurch-Stouffville is considerably above average on income, educational achievement and occupational status. It also has a slightly younger population and lower farm population than average.

3. Recommendations

In terms of broad demographic similarity the first eight census consolidated subdivisions from the right-hand side of Table 5 can be considered as potential comparison areas. The Town of Halton Hills emerged from both analyses as the most similar demographically to Whitchurch-Stouffville and, all other things being equal, must be considered as the best possibility. The remaining seven areas (East Gwillimbury, Flamborough, Tecumseth, Erin, Grimsby, Uxbridge and Vespra) are all relatively close demographically to Whitchurch-Stouffville and any one could be selected with a high degree of confidence. It will be noted from Table 6, however, that most of these areas deviate slightly from Whitchurch-Stouffville.

For example, East Gwillimbury and Flamborough rank a bit higher on economic status, Grimsby is slightly lower on income and British ethnicity while Uxbridge has a slightly higher farm population.

The remaining census consolidated subdivisions in Table 6 are possible candidates but only after the first eight areas have been eliminated. Caledon, for example, exhibits considerably higher economic status than Whitchurch - Stouffville while Ennismore has considerably lower economic status, particularly income. Of the areas analyzed in this study, the first eight in Table 6 are the best potential comparison areas. A final decision, however, will have to be made on the basis of exogenous variables such as proximity to Whitchurch - Stouffville and location of waste disposal sites.

TABLE 1

VARIABLES INCLUDED IN THE ANALYSIS, 1981 CENSUS

SHORTENED NAME	FULL DESCRIPTION
POP 20-34	Percent population 20 to 34 years of age
POP 65	Percent population 65 years of age and over
HHLDINC	Average household income
SOMEUNIV	Percent population 15 years of age and over not attending school with some post secondary education
MMANPROF	Percent male labour force engaged in managerial and professional occupations
MFARMER	Percent male labour force engaged in agricultural occupations
BRETHNIC	Percent population British ethnicity
OCCUP12	Percent private households occupying present home for two years or less

TABLE 2

FACTOR STRUCTURE: WHITCHURCH - STOUFFVILLE STUDY

VARIABLES	FACTOR LOADINGS			
	ECONOMIC STATUS	FAMILY STATUS	RURAL-URBAN CONTRAST	ETHNIC STATUS
POP 20-34		.90		
POP 65	-.44	-.61		.45
HHLDINC	.86			
SOMEUNIV	.89			
MMANPROF	.83		-.43	
MFARMER			.89	
BRETHNIC				.97
OCCUP 12		.75	-.48	

NOTE: Only factor loadings greater than 0.4 or less than -0.4 are shown.

TABLE 3

CENSUS CONSOLIDATED SUBDIVISIONS MOST SIMILAR TO WHITCHURCH-STOUFFVILLE BASED ON EIGHT CENSUS VARIABLES

Sequence Number	Census Consolidated Subdivision	Name	Similarity Score
82	24-15	Halton Hills	.459
99	26-65	Grimsby	.483
120	43-4	Tecumseth	.497
70	23-16	Erin	.524
87	25-30	Flamborough	.599
52	19-54	E.Gwillimbury	.665
43	18-29	Uxbridge	.899
60	21-24	Caledon	1.191
64	22-12	Mono	1.302
129	43-46	Oro	1.316
127	43-41	Vespra	1.411
47	19-38	Richmond Hill	1.422
17	15-18	Smith	1.448
41	18-17	Newcastle	1.465
112	30-4	North Dumfries	1.533
69	23-11	Eramosa	1.548
16	15-16	Ennismore	1.745
57	20-19	Etobicoke	1.769
42	18-20	Scugog	1.778
103	28-40	Simcoe	1.866

TABLE 4

CENSUS CONSOLIDATED SUBDIVISIONS MOST SIMILAR TO WHITCHURCH-STOUFFVILLE BASED ON FOUR FACTORS

Sequence Number	Census Consolidated Subdivision	Name	Similarity Score
82	24-15	Halton Hills	.071
52	19-54	E.Gwillimbury	.131
87	25-30	Flamborough	.163
127	43-41	Vespra	.201
43	18-29	Uxbridge	.235
120	43-4	Tecumseth	.263
70	23-16	Erin	.270
17	15-18	Smith	.271
99	26-65	Grimsby	.319
16	15-16	Ennismore	.337
60	21-24	Caledon	.472
14	15-11	N. Monaghan	.563
47	19-38	Richmond Hill	.586
4	14-16	Haldimand	.590
112	30-4	N. Dumfries	.605
41	18-17	Newcastle	.612
129	43-46	Oro	.718
133	43-56	Medonte	.848
69	23-11	Eramosa	.876
80	24-2	Burlington	.885

TABLE 5

SUM OF RANKS

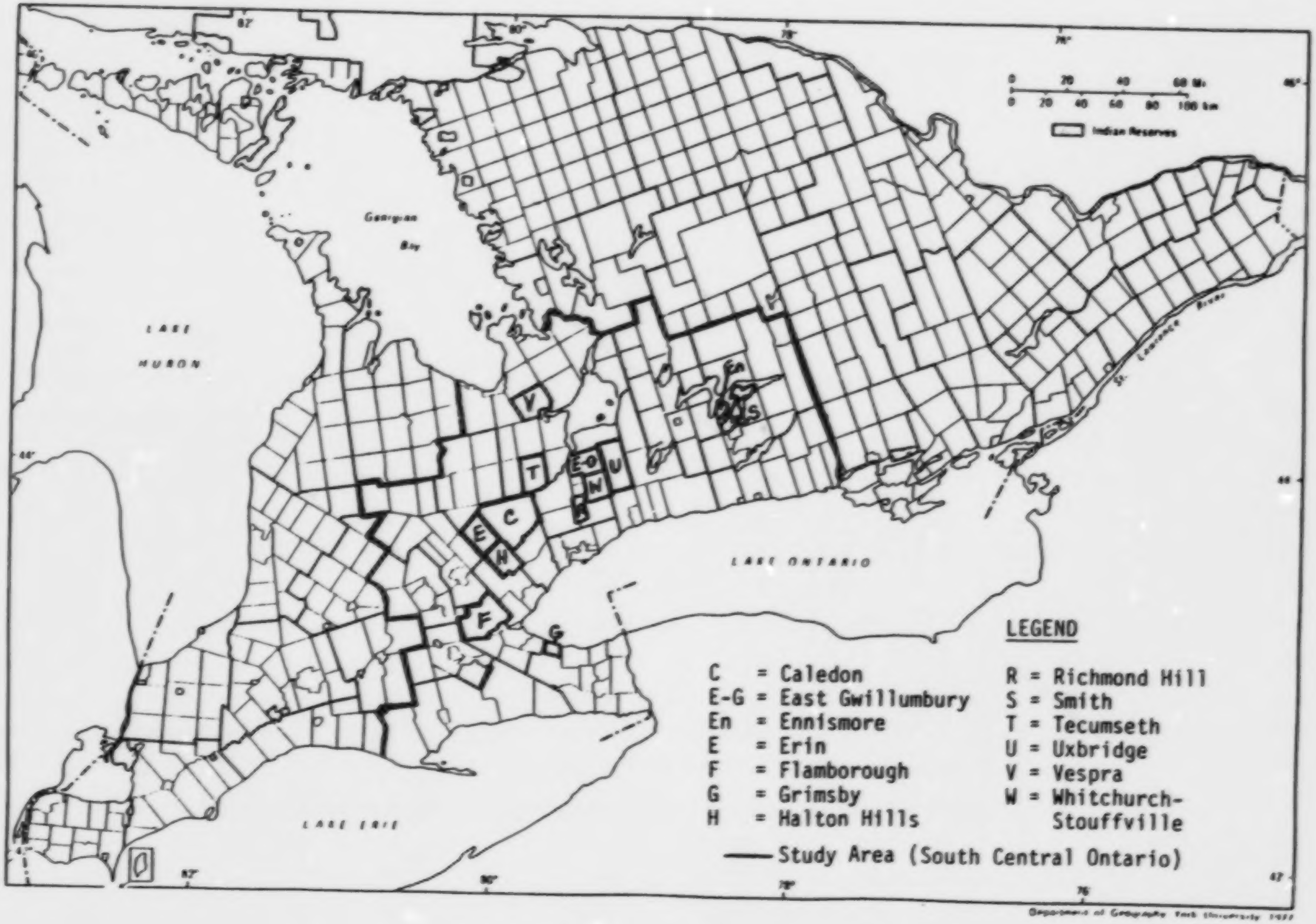
CENSUS CONSOLIDATED SUBDIVSION	RANK-FACTORS	RANK-VARIABLES	SUM RANKS	Census Consolidated Subdivisions Rank Ordered by Sum of Ranks
Halton Hills	1	1	2	1. Halton Hills
East Gwillimbury	2	6	8	2. East Gwillimbury
Flamborough	3	5	8	3. Flamborough
Vespra	4	11	15	4. Tecumseth
Uxbridge	5	7	12	5. Erin
Tecumseth	6	3	9	6. Grimsby
Erin	7	4	11	7. Uxbridge
Smith	8	13	21	8. Vespra
Grimsby	9	2	11	9. Caledon
Ennismore	10	17	27	10. Smith
Caledon	11	8	19	11. Richmond Hill
North Monaghan	12	20	32	12. Ennismore
Richmond Hill	13	12	25	

TABLE 6

VARIABLES LISTING FOR CENSUS CONSOLIDATED SUBDIVISIONS MOST SIMILAR TO WHITCHURCH - STOUFFVILLE

VARIABLES	MEAN $\bar{x}$	STANDARD DEVIATION	Whitchurch Stouffville	Halton Hills	E. Gwillimbury	Flamborough	Tecumseth	Erin	Grimsby	Uxbridge	Vespra	Caledon	Smith	Richmond Hill	Ennismore
POP 20-34	22.9	3.1	24.1	23.9	23.0	23.4	24.0	23.8	23.2	22.2	21.8	22.1	20.4	25.9	20.7
POP 65	11.1	4.4	9.8	6.4	6.8	10.0	7.7	7.9	10.5	10.2	5.8	6.2	9.9	8.1	9.3
HLDINC	23,932	5,261	30,821	29,271	31,598	28,993	27,728	29,416	27,736	27,923	27,714	33,943	26,596	30,920	24,228
SOMEUNIV	10.4	4.4	12.8	12.6	14.9	16.4	11.4	14.2	13.9	12.8	13.3	15.8	12.5	14.2	11.3
MANPROF	16.5	7.1	22.9	23.7	22.7	25.2	21.0	22.3	22.8	22.3	21.4	26.0	19.3	25.7	20.1
FARMER	11.9	10.1	6.9	4.5	8.4	8.3	9.6	8.3	6.2	13.5	8.5	7.9	7.2	2.9	5.2
ETHNIC	65.0	15.8	67.2	69.0	68.6	61.7	71.8	75.7	57.3	73.1	74.5	66.9	74.2	56.1	76.7
OCCUP 12	27.3	6.6	25.5	27.9	29.7	27.1	27.2	29.3	26.8	30.3	31.1	28.8	24.8	33.4	26.1
FACTORS															
ECONOMIC STATUS	0	1.0	1.08	1.00	1.43	1.41	.68	1.13	.88	.93	1.00	1.97	.77	.96	.54
FAMILY STATUS	0	1.0	-.11	.26	.09	-.44	.35	.29	-.41	.02	.24	-.26	-.70	.65	-.44
RURAL-URBAN	0	1.0	.06	.03	.33	-.18	.35	.24	-.41	.27	.29	.40	-.02	-.57	-.20
ETHNIC	0	1.0	.04	.07	.18	-.17	.30	.62	-.41	.66	.51	.07	.34	-.39	.48

Figure 1: Census Consolidated Subdivisions Most Similar Demographically to Whitchurch-Stouffville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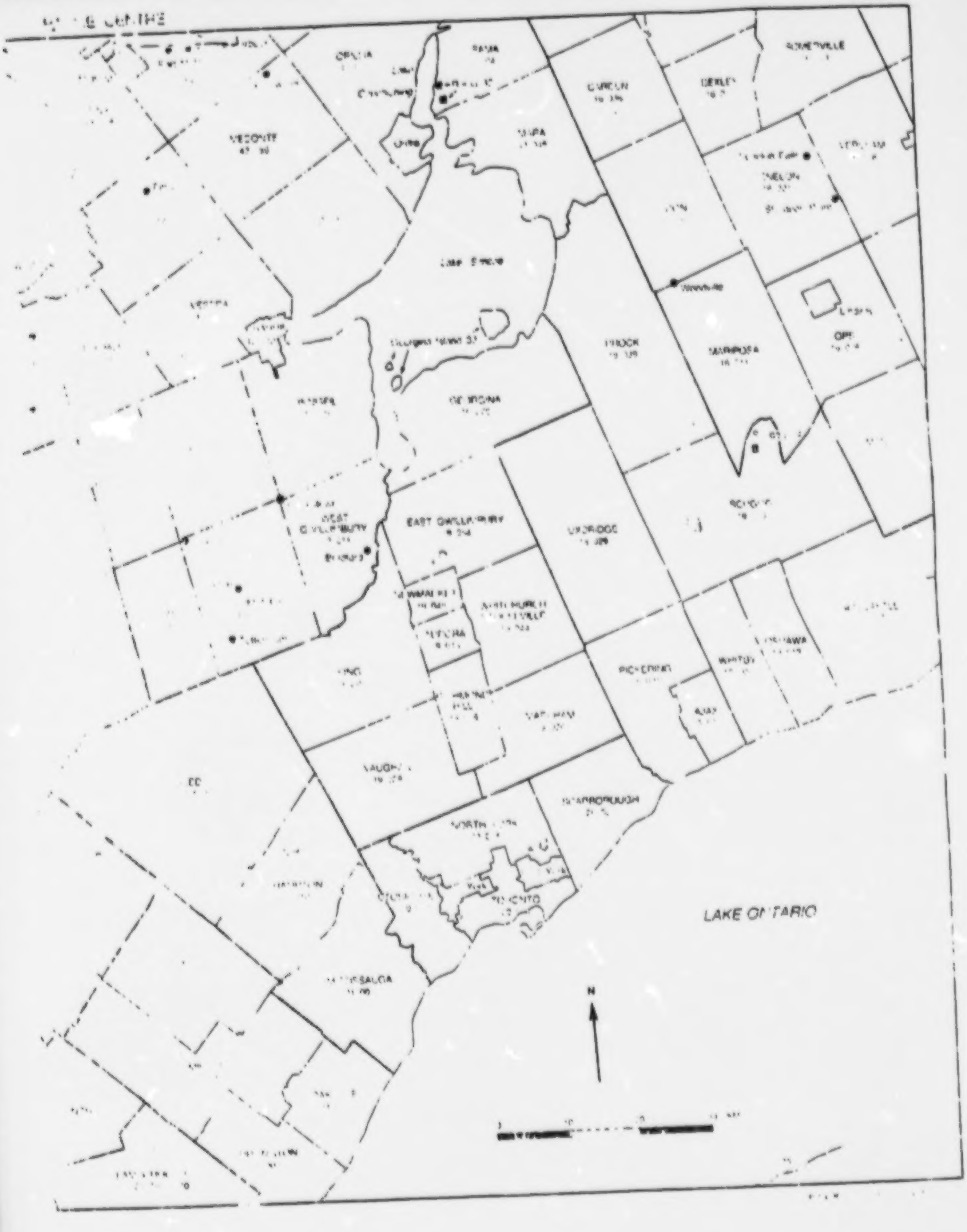
LAKE ERIE
St. Lawrence River
V
T
E-G
U
W
R
C
E
H
F
G
En
S
LEGEND
C = Caledon
E-G = East Gwillumbury
En = Ennismore
E = Erin
F = Flamborough
G = Grimsby
H = Halton Hills
R = Richmond Hill
S = Smith
T = Tecumseth
U = Uxbridge
V = Vespra
W = Whitchurch-Stouffville
Study Area (South Central Ontario)
76°
78°
80°
82°
44°
46°
42°

Department of Geography York University [illegible]

Appendix A

Maps Showing the Location of Census Consolidated Subdivisions in South - Central Ontario

Source: Statistics Canada, Catalogue 99-907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RAMA
MEDONTE
MARA
CARDEN
DIGBY
SOMERVILLE
VERULAM
FENELON
Fenelon Falls
Sturgeon Point
Lake Simcoe
VESPRA
Georgina Island
GEORGINA
BROCK
MARIPOSA
Woodville
Lindsay
OPS
WEST GWILLIMBURY
Bradford
EAST GWILLIMBURY
NEWMARKET
AURORA
WHITCHURCH-STOUFFVILLE
UXBRIDGE
SCUGOG
KING
RICHMOND HILL
MARKHAM
PICKERING
AJAX
WHITBY
OSHAWA
VAUGHAN
SCARBOROUGH
NORTH YORK
York
TORONTO
ETOBICOKE
MISSISSAUGA
LAKE ONTARIO
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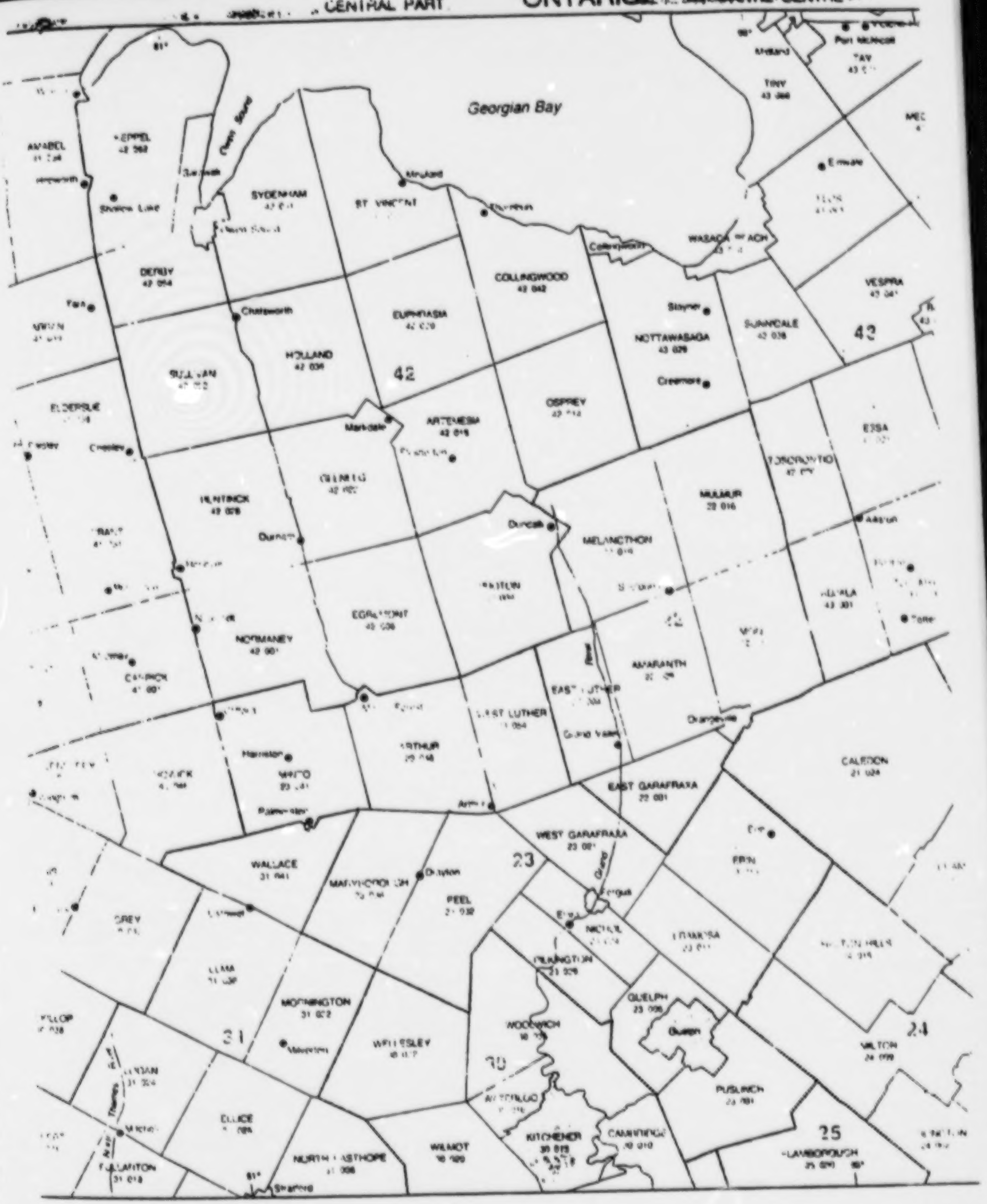
20

CENTRAL PART ONTARIO PARTIE CENTRE



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Port McNicoll
Midland
TAY
TINY
KEPPEL
42 062
AMABEL
Hepworth
Shallow Lake
SYDENHAM
ST. VINCENT
Meaford
Thornbury
Collingwood
WASAGA BEACH
Elmvale
VESPRA
DERBY
42 054
Tara
Chatsworth
EUPHRASIA
42 020
COLLINGWOOD
42 042
Stayner
NOTTAWASAGA
43 029
SUNNIDALE
43 038
43
HOLLAND
42 036
SULLIVAN
42
Creemore
OSPREY
ARTEMESIA
42 018
Markdale
Flesherton
ELDERSLIE
Chesley
ESSA
TOSORONTIO
MULMUR
22 016
HUNTINGDON
42 028
GLENELG
Durham
Dundalk
MELANCTHON
Alliston
Hanover
Shelburne
PROTON
EGREMONT
42 006
ADJALA
43 001
Tottenham
NORMANBY
42 001
AMARANTH
CARRICK
41 001
EAST LUTHER
WEST LUTHER
Mount Forest
Orangeville
Grand Valley
Harriston
ARTHUR
23 016
MINTO
Palmerston
Arthur
EAST GARAFRAXA
22 001
CALEDON
21 024
WEST GARAFRAXA
23 001
WALLACE
31 041
MARYBOROUGH
Drayton
PEEL
23
GREY
ERIN
Listowel
Fergus
Elora
NICHOL
ERAMOSA
23 011
PILKINGTON
23 026
ELMA
MORNINGTON
31 002
GUELPH
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Guelph
WOOLWICH
MILTON
24 009
24
WELLESLEY
31
30
PUSLINCH
23 001
WATERLOO
ELLICE
CAMBRIDGE
KITCHENER
30 015
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FLAMBOROUGH
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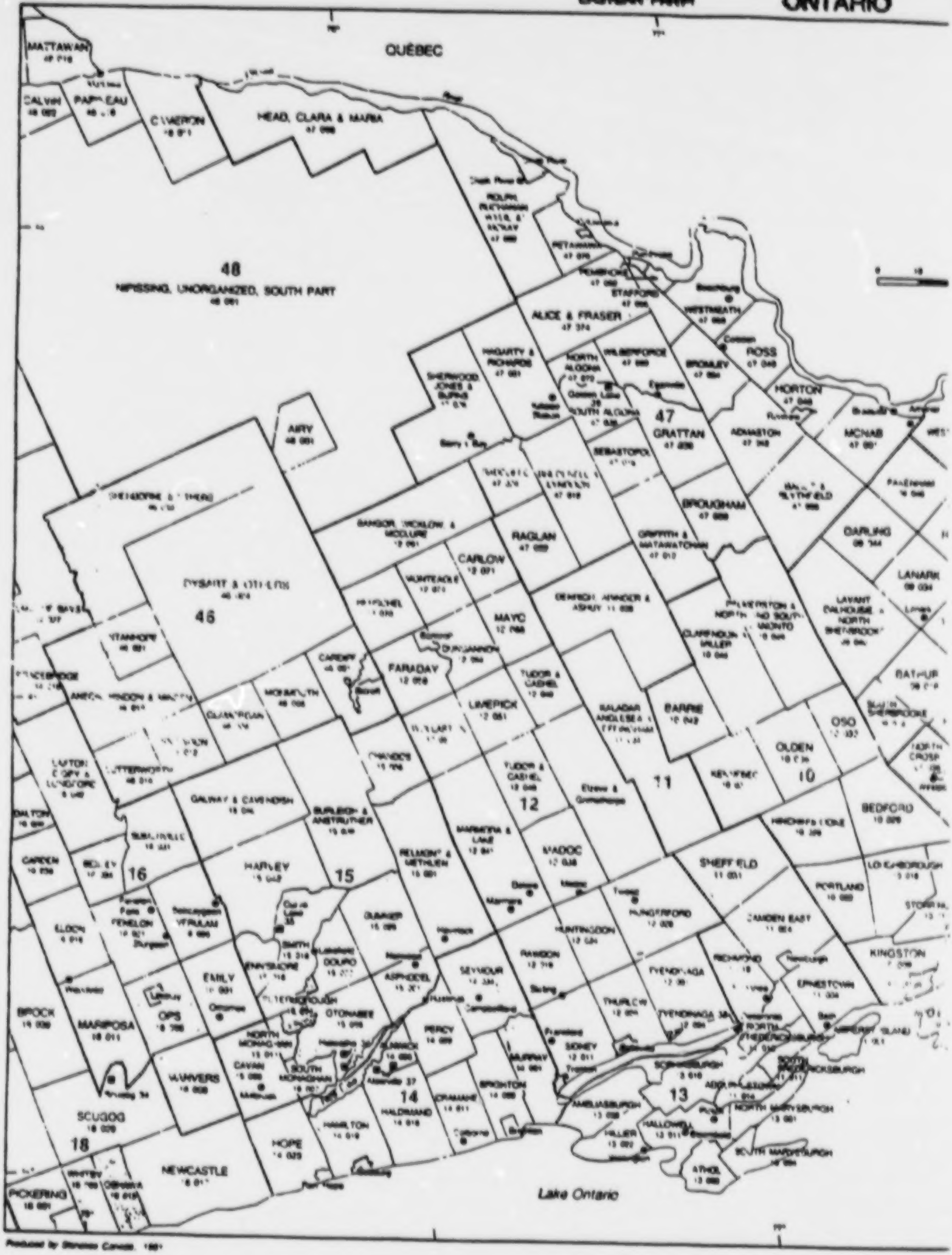
FULLARTON
31 018
Stratford
Mitchell
Thames River
81°
80°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MATTAWAN
CALVIN
PAPINEAU
CAMERON
HEAD, CLARA & MARIA
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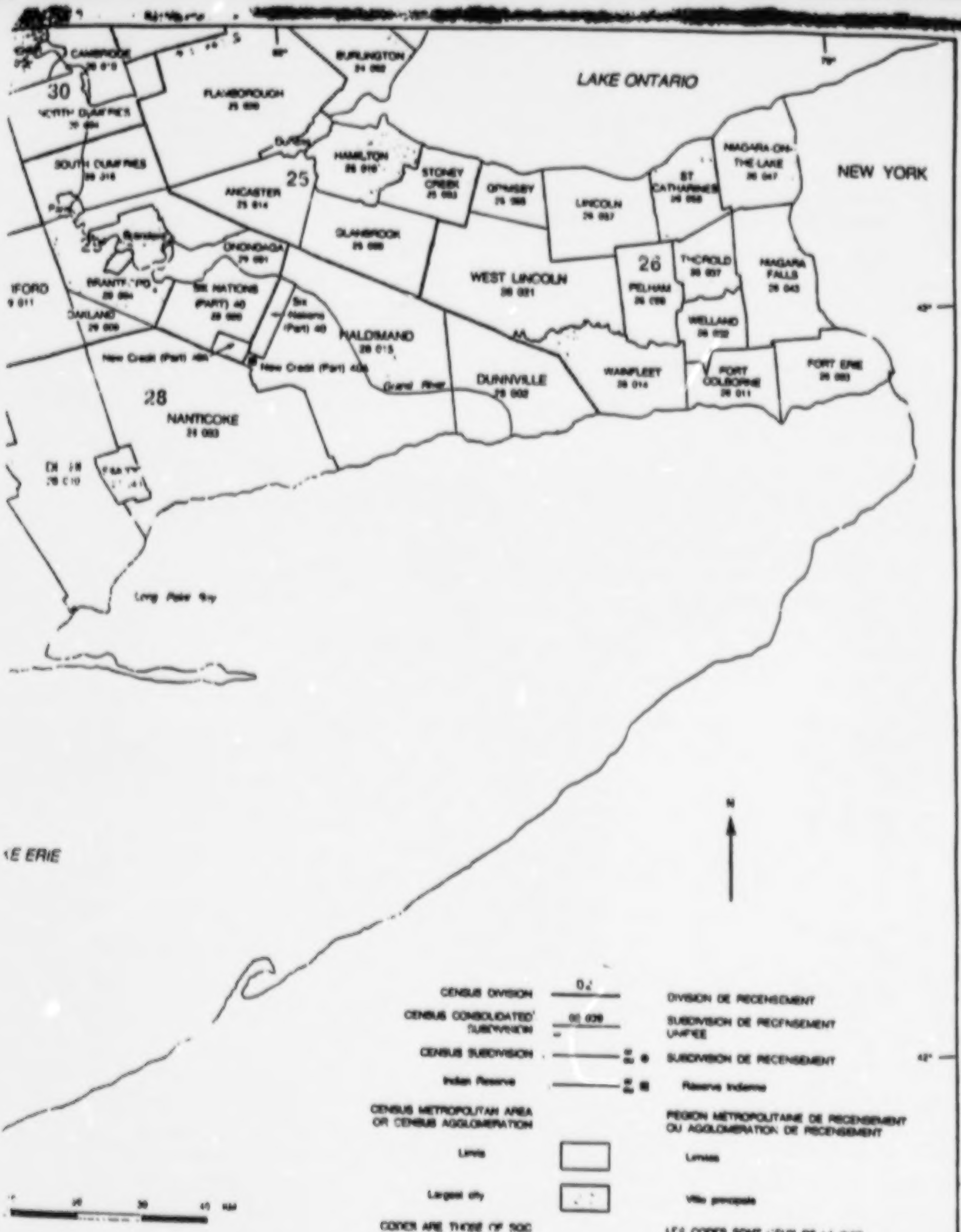
NIPISSING, UNORGANIZED, SOUTH PART
ROLPH, BUCHANAN, WYLIE & McKAY
PETAWAWA
PEMBROKE
STAFFORD
WESTMEATH
ALICE & FRASER
HAGARTY & RICHARDS
SHERWOOD, JONES & BURNS
NORTH ALGONA
WILBERFORCE
BROMLEY
ROSS
Cobden
Golden Lake
SOUTH ALGONA
Eganville
47
GRATTAN
HORTON
ADMASTON
McNAB
Renfrew
Arnprior
AIRY
Barry's Bay
SEBASTOPOL
BROUGHAM
BAGOT & BLYTHFIELD
PAKENHAM
DARLING
LANARK
GRIFFITH & MATAWATCHAN
RAGLAN
CARLOW
BANGOR, WICKLOW & McCLURE
MONTEAGLE
DYSART & OTHERS
46
STANHOPE
DENBIGH, ABINGER & ASHBY
LAVANT, DALHOUSIE & NORTH SHERBROOKE
PALMERSTON & NORTH AND SOUTH CANONTO
CLARENDON & MILLER
MAYO
DUNGANNON
Bancroft
CARDIFF
FARADAY
MONMOUTH
GLAMORGAN
TUDOR & CASHEL
LIMERICK
KALADAR, ANGLESEA & EFFINGHAM
BARRIE
BATHURST
SOUTH SHERBROOKE
OSO
OLDEN
10
KENNEBEC
11
NORTH CROSBY
BEDFORD
CHANDOS
BUTTERWORTH
LAXTON, DIGBY & LONGFORD
DALTON
GALWAY & CAVENDISH
BURLEIGH & ANSTRUTHER
MARMORA & LAKE
12
Elzevir & Grimsthorpe
HINCHINBROOKE
LOUGHBOROUGH
SOMERVILLE
CARDEN
BEXLEY
16
HARVEY
15
BELMONT & METHUEN
MADOC
SHEFFIELD
PORTLAND
STORRINGTON
Fenelon Falls
FENELON
VERULAM
ELDON
DUMMER
Havelock
Marmora
Deloro
Madoc
Tweed
HUNGERFORD
CAMDEN EAST
KINGSTON
SMITH
DOURO
ENNISMORE
EMILY
Norwood
ASPHODEL
SEYMOUR
RAWDON
HUNTINGDON
TYENDINAGA
RICHMOND
Newburgh
ERNESTOWN
Lindsay
OPS
MARIPOSA
BROCK
PETERBOROUGH
OTONABEE
Campbellford
Stirling
THURLOW
Deseronto
Bath
AMHERST ISLAND
NORTH MONAGHAN
CAVAN
SOUTH MONAGHAN
Millbrook
PERCY
SIDNEY
Frankford
Trenton
NORTH FREDERICKSBURGH
SOUTH FREDERICKSBURGH
MANVERS
14
CRAMAHE
BRIGHTON
MURRAY
SOPHIASBURGH
ADOLPHUSTOWN
NORTH MARYSBURGH
13
SCUGOG
AMELIASBURGH
HALLOWELL
Picton
HAMILTON
HALDIMAND
Colborne
Brighton
HILLIER
Wellington
SOUTH MARYSBURGH
18
HOPE
ATHOL
NEWCASTLE
Port Hope
Cobourg
PICKERING
WHITBY
OSHAWA
Lake Ontario

Produced by Statistics Canada, [illegible]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NEW YORK
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CAMBRIDGE
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NORTH DUMFRIES
BURLINGTON
FLAMBOROUGH
Dundas
HAMILTON
25 010
SOUTH DUMFRIES
ANCASTER
25 014
25
STONEY CREEK
25 003
GRIMSBY
LINCOLN
ST CATHARINES
NIAGARA-ON-THE-LAKE
GLANBROOK
Brantford
ONONDAGA
WEST LINCOLN
26
PELHAM
THOROLD
NIAGARA FALLS
IFORD
BRANTFORD
SIX NATIONS (PART) 40
Six Nations (Part) 40
HALDIMAND
OAKLAND
WELLAND
New Credit (Part) 40A
Grand River
DUNNVILLE
WAINFLEET
PORT COLBORNE
FORT ERIE
28
NANTICOKE
Long Point Bay
N
CENSUS DIVISION
DIVISION DE RECENSEMENT
CENSUS CONSOLIDATED SUBDIVISION
SUBDIVISION DE RECENSEMENT UNIFIÉE
CENSUS SUBDIVISION
SUBDIVISION DE RECENSEMENT
Indian Reserve
Réserve indienne
CENSUS METROPOLITAN AREA OR CENSUS AGGLOMERATION
RÉGION MÉTROPOLITAINE DE RECENSEMENT OU AGGLOMÉRATION DE RECENSEMENT
Limits
Limites
Largest city
Ville principale
CODES ARE THOSE OF SGC
LES CODES SONT CEUX DE LA CGT
20
30
40
KM
80°
79°
43°
42°

[illegible] Canada, [illegible]

MDS
Laboratories

Page

CLIENT
GOSS, GILROY & ASSC.
601-124 OCONNOR ST.
OTTAWA, ONTARIO
K1P 5M9

86

REQUESTING PHYSICIAN
86
DR J NIXON

PATIENT NAME

BIRTHDATE
SEX
PHONE NUMBER
OHIP NUMBER
SUBSCRIBER INTL.
REFERENCE NO.

ACCESSION NUMB

DATE OF SERVICE
DATE REPORTED

REPORT STATUS
FINAL

	TEST NAME	RESULT	REFERENCE RANGE	UNITS	TES LOC
A	HEMOGLOBIN				
0				G/L	
A	HEMATOCRIT				
A	WHITE BLOOD CELL COUNT			X10E9/L	
A	BLOOD FILM EXAMINATION:NEUTS				
A	LYMPH				
A	MONO				
A	EOS				
A	RBC MORPHOLOGY				
A	WBC MORPHOLOGY				
A	PLATELETS				
A	CHOLESTEROL				
D				MMOL/L	
A	ASPARTATE TRANSAMINASE (AST)			U/L	
A	ALANINE TRANSAMINASE (ALT)			U/L	
A	ALKALINE PHOSPHATASE			U/L	

FINAL REPORT
PND = Pending * = Not previously reported

MEDICAL RECORDS REVIEW FORM

Docket No.: ☐☐☐ ☐☐☐ ☐☐ Person No.: ☐

SELF-REPORTED INFO. DATE TREATMENT	PREGNANCY OUTCOMES		CLINICAL DIAGNOSIS AGREEMENT/DISAGREEMENT SCALE (+) 1	2	3	4	5 (-)		COMMENTS
	A Baby born dead	A	①	②	③	④	⑤		
	B Miscarriage	B	①	②	③	④	⑤		
	C Therapeutic abortion	C	①	②	③	④	⑤		
	D Birth defect (sp) ________	D	①	②	③	④	⑤	☐☐	
	E Low birth weight (sp) ________	E	①	②	③	④	⑤	☐☐	
	F Premature birth (sp) ________	F	①	②	③	④	⑤	☐☐	
	G Pregnancy Complication (sp) ________	G	①	②	③	④	⑤	☐☐	
	LONG-TERM CONDITIONS								
	9 - Allergies	9	①	②	③	④	⑤		
	10 - Skin problems	10	①	②	③	④	⑤		
	11 - Headaches	11	①	②	③	④	⑤		
	14 - Emotional disorders	14	①	②	③	④	⑤		
	21 - Liver disorders	21	①	②	③	④	⑤		
	22 - Leukemia	22	①	②	③	④	⑤		
	23 - Cancer (sp) ________	23	①	②	③	④	⑤	☐☐	
	25 - Intestinal disorders	25	①	②	③	④	⑤		
	30 - Mental retardation	30	①	②	③	④	⑤		
	32 - Kidney disease	32	①	②	③	④	⑤		
	34 - Infertility	34	①	②	③	④	⑤		
	35 - Ser. tr. with back	35	①	②	③	④	⑤		
	36 - Ser. tr. with legs/hips	36	①	②	③	④	⑤		
	37 - Ser. tr. with arms/shoulders	37	①	②	③	④	⑤		
	38 - Ser. tr. with bones/joints	38	①	②	③	④	⑤		
	39 - Ser. tr. with hands/feet	39	①	②	③	④	⑤		
	40 - Ser. tr. with memory	40	①	②	③	④	⑤		
	41 - Other (sp) ________	41	①	②	③	④	⑤	☐☐	

Total Conditions: ☐☐ Totals: ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

GOSS GILROY
& ASSOCIATES LTD.

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(613) 230-5577

COMMUNITY HEALTH STUDY OF THE RESIDENTS OF
WHITCHURCH-STOUFFVILLE, EAST GWILLIMBURY AND TECUMSETH

9 May 1986

Dear

The Ontario Ministry of Health is sponsoring a community health study in the Whitchurch-Stouffville, East Gwillimbury and Tecumseth areas. Political leaders of the three areas and the Medical Officers of Health in the Regional Municipality of York and the Simcoe County District Health Unit support the project. The purpose of the study is to establish whether or not the residents of Whitchurch-Stouffville are experiencing health problems which may be attributable to contaminated water. The study will also assist all three areas in planning and assessing overall health needs and services.

We are surveying 15% of the households, about 1800 in all, in a three-step process.

- The first step involves a telephone or personal interview to obtain general health information.
- The second step requires a small sub-sample of residents, age five and over, to provide a blood specimen which will be taken by a technician from MDS Laboratories. If any of your patients were requested to supply a blood specimen, a copy of the results will be forwarded to you in late June, 1986.
- The third step consists of **a review of medical records** of all those respondents who, in the last 12 months, have visited a physician for other than routine care or have been admitted overnight to a hospital.

All three steps are voluntary and require the consent of the respondents. Strictest confidence is maintained in all study protocols, which have been previously approved by the Research Ethics Committee at the Ottawa Civic Hospital (Dr. Raphael Saginur, M.D., Chairman).

.../2

We are asking your assistance in giving us access to patient records. The review of medical records will be done by experienced nurses. Copies of the records will not be needed. A copy of the signed medical consent form will be left within each file.

We will need your written permission to have access to the medical records in your facility. A registered nurse will telephone you to make arrangements for picking up your letter of permission, and to ascertain the most appropriate time for reviewing medical records. At that time, she will give you (or your secretary) the name of your patients who have signed consents and whose medical records we wish to review.

All information from the medical records will be used only by members of the research team, and will remain strictly confidential. A code number will be used instead of the respondent's name and any identifying information will be kept separate in a secure file in the site office in Stouffville. All identifying information will be destroyed when the study is completed. Only statistical summaries will be published.

The study is headed by Goss, Gilroy & Associates Ltd. and includes specialists from the Department of Epidemiology and Community Medicine at the University of Ottawa, MDS Laboratories, MacLaren Plansearch, Inc. and a well known environmental epidemiologist.

The two site supervisors are Mrs. Pamela Baxter, M.B.A. and Mrs. Gisèle Carroll, M.P.H. They are located at the Community Health Study office at 136 Main St. E. in Stouffville, telephone (416) 640-7252 or toll free at 1-800-387-0407. If you have any questions or concerns about the study, please do not hesitate to call me, collect, at our Ottawa office or call one of the site supervisors.

Your cooperation in assisting in this study would be greatly appreciated.

Yours sincerely,

Tom Goss

Thomas I. Goss, Ph.D.
Project Director

TIG/lh

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COMMUNITY HEALTH STUDY OF THE RESIDENTS OF
WHITCHURCH-STOUFFVILLE, EAST GWILLIMBURY AND TECUMSETH

5 May 1986

Dear

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Your cooperation in assisting in this study would be greatly appreciated.

Yours sincerely,

Thomas I. Goss

Thomas I. Goss, Ph.D.
Project Director

TIG/lh

APPENDIX G: GLOSSARY OF TERMS*

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*Acknowledgement is given to the Ministry of Health, and to O.S. Miettinen (as author of the text: Theoretical Epidemiology, John Wiley & Sons Ltd., 1985), for input into the Glossary.

APPENDIX G: GLOSSARY OF TERMS

Definitions and Terms Frequently Used in the WS Health Study

(The terms are explained as they are used in this report, and do not necessarily have the consensus definitions in other sources.)

A priori - Refers to statements or assumptions or statistical criteria set forth in advance of commencing the field work of the Study; the converse of this term is either post-hoc or a posteriori.

Accuracy - The "accuracy" of a survey result is determined by the joint efforts of sampling and non-sampling errors.

Achieved Sample - Sample of residents/households that were included in the analysis.

Acute - Of short duration or sudden onset.

Adjusted Rate - The projection of a crude rate to another (possibly hypothetical) population structure removing the confounding effect of a factor; that is, a weighted average of factor-specific (conditional) rates, with the weights proportional to the sizes of the corresponding experiences in another standard population. The same standard population is used for all comparison areas, which makes the comparisons independent of the factor for which standardization was used. See Crude or Standardized.

Adverse Reproductive Outcomes - Includes problems with pregnancy or delivery, birth defects, stillbirths and miscarriages.

Algorithms - A step-by-step procedure for solving a problem or accomplishing some end; in the clinical context this refers to classification methods or treatment decisions done by pre-determined ground rules.

Analysis of Data - The process of summarizing, under a statistical model, the evidence in the data with reference to the object of research.

Ascertainment - Verification, certification.

Assay - Determination of blood content.

Assessment - Classification according to a scale of quantity or preference. Similar to evaluation.

Association - Occurrence relation or function. For example, refers to the frequency (statistical) aspect of a phenomenon, as in "the occurrence of complications".

Bias - Possible (non-random) deviation of an observed result from its 'true' values (i.e., as determined from a large number of hypothetical replications of the study), that is due to some specific factor; different from sampling (random) error.

Biased Sampling - Sampling in which the sampling probability depends (in an unknown way) on a determinant of the observation.

Birth Rate - The number of live-births per 1000 population:

$$\frac{\text{LB} \times 1000}{\text{total population}}.$$

Bio-markers (physical) - Physical/biological factors in a person that might serve as an indicator of ill-health, now or in the future (e.g, abnormal WBC (white blood cell) count).

Blinded Study - Study characterized by arrangements designed to assure the observers' lack of awareness of whether the subject is a member of the index (target) or the reference (control) population.

CASS - Congenital Anomalies Surveillance System (see text: section 3.2).

Census - 100% sampling, or 100% sample.

Chronic - Long-lasting or long-term.

CHS - Canada Health Survey: data are from 1978-79 Statistics Canada Health Survey and figures quoted are for all of Ontario except when specified.

Clinical Outcome - The symptoms, signs and diagnoses that are plausibly associated with environmental risk factors of concern in any of the Study areas/sub-areas.

Clinical Significance - A difference sufficiently great that it is impressive because of its consequences for the health of people; clinical significance takes into account the unavoidable reality of uncontrollable or unforeseeable biases as well as real but trivial differences; clinical significance is referred to as "delta" by many statisticians and in every day language it could be referred to as "the difference that makes a difference".

Clustering - The phenomenon of "bunching-up" of people or events or diagnoses; clustering could be in relation to time (for instance there may be an unusual number of cases of measles within a three-month period in a given location), it could be in relation to geography (there might be an unexpectedly high number of cases of absenteeism from school in one village as compared to surrounding ones); clustering could be in relation to diagnosis itself (even though total mortality due to heart disease might be the same in two areas, one could note a clustering of many cases of heart attack in one community versus another).

Cohort - A group of persons sharing common characteristics at a given point in time and defined by an event such as birth, admission to hospital or residence in a particular location.

Confidence Level - See Precision and/or Estimate.

Confounding Variable (Confounder) - An extraneous determinant of the outcome parameter in terms of which there is lack of comparability of effects and/or populations; also, the term is sometimes used for an extraneous factor that explains the lack of comparability of information.

Congenital Anomaly Rate - Number of specific anomalies (SA) as reported during the first week of the life by the federal-provincial system per 10,000 total births:

$$\frac{\text{no. of SA} \times 10{,}000}{\text{LB} + \text{SB}}.$$

Control Area - Reference group/population that provides comparative (or reference) information for the experience of the index (Study) area. EG and Tec were the selected control areas for the study.

Correlation - Association, dependence (not necessarily cause/effect).

Covariate - An extraneous variable that may have to be taken into account to avoid distortion or inefficiency in the study of the relation at issue (i.e., inherently conditional on the covariate).

Cross-Sectional Study - A study whose base is a population cross-section (i.e., the status of a population as of a particular calendar point in time, as opposed to, a population's experience over time).

Crude Rate - A directly computed (observed) rate of an event/episode in a population; that is, a weighted average of empirical specific (conditional) rates, with weights proportional to the actual sizes of the groups providing those specific rates. See Adjusted and Standardized Rate.

Demography - The statistical study of human populations especially with reference to size and density, distribution and vital statistics.

Design Level I - The basic study design, comprising of simple random samples from the main areas under investigation (WS, EG, Tec).

Design Level II - The secondary design, where subgroups of the WS study area (WS-A, B, C) were identified in relation to proximity to site of landfill; allows estimates to be calculated for possible dose-effect relationships.

Determinant - Of occurrence. A characteristic of individuals (constitutional, behavioural, or environmental) on which a parameter of occurrence depends (causally or noncausally).

Diagnosis - The inferred (rather than necessarily the actual) state of, or event in, a person (or an occurrence relation). Also, the process of arriving at an inference as to the state of, or event in, a person (or an object).

Dose-effect Relationship - The relation between the level of a determinant and the magnitude of the effect.

Early Neonatal Death (END) - Death of a live born infant up to 7 days of age.

Early Neonatal Death Rate - Number of early neonatal deaths per 1000 live births: $\frac{\text{END x 1000.}}{\text{no. of LB}}$

Effect - The change in the outcome parameter brought about by a particular cause or preventive.

EG - East Gwillimbury.

Epidemiology - The study of determinants of health and disease in human populations; it includes the study of incidence, distribution and control of disease in a population. Research into occurrence relationships or associations of a phenomenon.

Estimate - Point estimate is a single value for a parameter computed from a particular set of data (using a given estimator). An interval estimate (or, confidence interval) is an interval for a parameter (e.g., mean) constructed from such data to assure that in a specified proportion of such applications (out of a large number of them) it covers the actual value of the parameter.

Estimator - A function of the data, designed to provide estimates; that is, a (conceptual) way of computing an estimate from data, such as a mean or variance.

Etiology - Causal origin, or the study/explanation of cause of disease.

Evidence - Information (drawn from study) tending to establish fact.

Exposure - Refers primarily to environmental (as opposed to constitutional or behavioural) determinant(s), usually for the index area of study.

Extraneous Characteristic/Factor - A characteristic that is not part of the research objective (e.g., occurrence relation) per se, but that may have to be considered in the interest of validity/efficiency (as a conditioning factor). A characteristic/factor that a covariate represents.

Factor - A cause or causal/preventive determinant (e.g., white blood cell count). Also, a misnomer for determinant or a category.

Frame - Consists of the inventory/listing of the sampling units. It may involve a computerized list of households/people that represent a population of interest. The frame is satisfactory if when covered 100% it provides results useful for inferences with respect to the (sampled) population.

Health Indicator - A characteristic (variate) whose realization, or a test whose outcome, conveys information about the presence of future occurrence of the phenomenon at issue.

Hydrogeology - Study of ground-water flow pattern in the context of geologic features.

Hypothesis - A tentative piece of scientific (theoretical) knowledge; that is, a scientific idea. Null hypothesis refers to the proposition of no relation between an outcome parameter and its potential determinant, given a hypothesis of such a relation. Alternative hypothesis refers to a "competitor(s)" for the hypothesis at issue.

HMRI - Hospital Medical Records Institute.

Index Area (IA) - Index Area, or the main area of interest exposed to environmental contaminants of concern. For our purposes, WS, the main area of interest for the study, was modelled into zones of potential exposure to contaminated water, denoted WS-A, WS-B, and WS-C.

ICD9 - 9th revision of the International Classifiction of Diseases, World Health Organization, Geneva (1978).

Incidence - The appearance of a particular event in a population (of candidates over time). See Prevalence.

Inference - In drawing statistical inferences (or making projections) from the sample, it is emphasized that the results of a sample or of a complete coverage refer to the frame, not necessarily to the population. The objective inferences in regard to the precision of a sample (e.g., standard errors) refer to the frame. If there is a gap between the frame and the population, these inferences do not necessarily apply to the population. One fills in the gap (i.e., extends an inference from the frame to the population) with aid of substantive knowledge, not by statistical theory.

Late Neonatal Death (LND) - Death of a live born infant between the ages of 7 and 28 days.

Live Births (LB) - Newborn with any sign of life regardless of gestational age or birthweight.

MacLaren Report - Hydrogeological Report on the development of a risk model for the Whitchurch-Stouffville Health Study. See Appendix D.

Main Areas - The study area (WS) and the two comparison areas (EG and Tec).

Mean - An estimator given by the arithmetic average. In simple random sampling, the mean of the sample is an unbiased point estimator of the population average.

Methodology - The body of methods in a discipline, such as (epidemiologic) survey design methodology.

Model - A formal, simplified representation of, or the terms in which to consider, the object of study (i.e., occurrence relationships) or the sample design basis (e.g., MacLaren Report risk model).

Morbidity Statistics - Frequency of the occurrence of illness.

Mortality Statistics - Frequency of the occurrence of death.

Neonatal Death (ND) - Death of a live born infant up to 28 days of age.

Neonatal Death Rate - No. of neonatal deaths per 1000 livebirths: $\frac{\text{ND x 1000}}{\text{no. of LB}}$.

Non-Response Rate - Proportion of sampled units which did not complete the interview.

Non-Sampling Error - Various possible uncertainties (e.g., observer measurement error; non-response bias; selection bias) other than those that arise from the random selection of sampling units. See Sampling Error.

Objective of Study - That which is to be achieved by a study (i.e., the advancement of knowledge about the epidemiologic/ etiologic aspects of a phenomenon).

OCTRF - Ontario Cancer Treatment and Research Foundation.

Outcome Variable - The end stage of a process, as in "the health outcome following treatment".

Parameter - A population measure (theoretical or empirical) of occurrence, or occurrence relation. Also, a constant in a statistical distribution model.

Perinatal Death (PD) - The sum of number of stillbirths and the number of early neonatal deaths. (SB + END)

Perinatal Death Rate - The number of perinatal deaths per 1000 live births: $\frac{\text{PD x 1000}}{\text{no. of LB}}$. (This rate may be calculated using total births (LB + SB) as the denominator.)

Period Prevalence - The frequency of disease in a population within a span of time. Equivalently, the prevalence of a particular health state or disease in a population of interest during a period of time. For instance the number of chronic health problems in the WS main area during the last 20 years. (This is to be contrasted with point prevalence which is the frequency of the disease at a given point in time.)

Phenomenon - An observable state or event (episode), susceptible of scientific description and/or explanation. Also, an exceptional, unusual, or abnormal occurrence.

Population - The population whose experience (in a defined segment of time) constitutes the study base (i.e., the residents of the study areas).

Post-Hoc (or, Posteriori) Hypotheses - Hypotheses that were not formally put forward at the outset of a study, but that are made only after looking at the data.

Power (to detect differences) - A statistical measure of ability of a sample in a study to detect differences (statistically) that are real. Typically, the larger the sample size used in a comparison, the higher the power of the statistical test/comparison. For example, the most powerful tests will involve 100% sample (census) coverage.

Precision - Statistical samples are evaluated in terms of "precision", which is expressed as a range of values, plus and minus, around the sample result and confidence (or "realibility"), which is expressed as a proportion of such ranges from all possible similar samples of the same size that would include the actual population value. Sample precision, also called sampling error, is a measure of the closeness between the sample estimate and the corresponding unknown population characteristic. Confidence (or reliability) measures the frequency with which the difference between the sample estimate and the population value does not exceed the precision. A reported precision of X% at a confidence level of .95 indicates, for example, that, among all possible samples, 95 per cent will have a difference between the sample estimate and the population characteristic less than or equal to X%. The precision of any estimate at a specified confidence is determined by the sampling distribution of the estimate.

Prevalence - The existence (as opposed to the inception or termination) of a particular disease in a population.

Prevalence Rate - The proportion of a population that has a particular disease.

Protocol - The plan of a scientific experiment or treatment recorded in writing before initiating the scientific work.

Quality - The totality of features and characteristics of a product/service that bear on its ability to satisfy given needs.

Quality Control - The operational techniques and the activities (planned/systematic actions) which sustain a quality of product/service that will satisfy given needs. Also, the use of such techniques and activities.

Random Sampling - See Simple Random Sampling.

Reference Area - See Control Area.

Reliability - See Precision.

Replacement Rate - Proportion of sampling units that had to be replaced by new units.

Replacement Sample - For a number of reasons, the initially selected respondent (target sample unit) may need to be substituted (or replaced) using another (randomly-generated) list of back-up respondents (replacement sample unit). The reasons for requiring replacement samples in this study are defined below:

(i) Cannot Locate
- published/unpublished phone and cannot locate address for home interview
- mail notice returned by Post Office and no phone number available
- returned by Post Office and address incorrect;

(ii) Unavailable
- no answer by phone and home interview attempts
- unpublished phone and no answer at home visit
- on holidays
- one contact (phone or home visit) but no further contact was successful by phone or home visit;

(iii) Moved/Moving
- also, vacant;

(iv) Office/Business/Not in Area
- for example, address in Markham, Toronto or other out-of-scope (area) locations;

(v) Deceased; and,

(vi) Inaccessible
- no answer by phone/unpublished phone and on home visit, premise was inaccessible, e.g., locked gate; guard dog, etc.

Response Rate - Proportions of sampling units that completed the questionnaire or the interview. See Non-Response Rate.

Sample (see Random Sampling) - A sub-group of the total population selected in order to represent the population and to allow inference to the population.

Sampling Error - Generally, known as the difference between the sample result and the result of an equal complete coverage. Since in practice complete coverage is usually impractical, and hence the true results unknown, probability limits for the range of this difference (i.e., the sampling error) is estimated from the sample.

Sampling Plan - Generally, a plan to identify the units of the population to be included in the sample. Usually, comprises of detailed design and development activities, involving all aspects of the study design (e.g., scope; coverage; intensity; costs; timing; etc.).

Sampling Unit - The essential basis (household; individual; item; record) from which information is sought as part of the sampling plan. The total of these units is known as the universe (or, population of interest).

Significant (Statistical) - Refers to the (statistical) assessment of sample results, expressed in probability terms (i.e., relative to observing the same results strictly due to change occurrence). Also, see Precision.

Simple Random Sampling - A simple random sample is a special type of random samplde, where a sample is selected by a process which gives every possible sample (of that size from that population) the same chance of selection. That is, the sample is totally free from selection bias.

Sociodemographic - Attributes to people referring to information on demographic and sociologic factors, such as age and sex, ethnic group, language, etc.

Socioeconomic - Relating to social status and economic position.

Spontaneous Abortion (SA) - Spontaneous expulsion of fetus before gestation of at least 20 weeks and/or birth weight of 500g and over.

Spontaneous Abortion Rate - Number of spontaneous abortions per 1000 live births: $\frac{\text{SA x 1000}}{\text{no. of LB}}$.

Standard Deviation - A particular measure of variability of a data distribution. See Variance.

Standard Error - Estimate (point) of the standard deviation of the sampling distribution (of a point estimator of a parameter, such as the sample mean or proportion).

Standardized Mortality Rate - A ratio which expresses the number of observed deaths in a defined area for a defined period compared to those you would expect if the rates of a reference population (such as an entire province) applied in the area concerned.

Standardized Rate - A rate adjusted to a structure (distribution, set of weights) viewed as a standard (common structure) for the purpose of comparison(s).

Statistical Design - Refers to the design of a study that would allow statistical comparisons of variables; choice of units is based on probabilistic (and other (e.g., budget; timing)) considerations.

Statistical Significance - A statement that indicates the likelihood that differences in numbers or rates or averages observed could have arisen by chance alone.

Stillbirth (SB) - Newborn with no sign of life with a gestational age of 20 weeks and more and/or birth weight of 500g and over.

Stillbirth Rate - Number of stillbirths per 1000 live births:

$\frac{\text{SB x 1000}}{\text{no. of LB}}$.

This rate may also be calculated using total births (LB + SB) as the denominator.

Stratified Sample - Sample designed to have sampling fractions among subdomains (strata) of the sampled population.

Stratum or Strata - Groups with similar characteristics and/or values; subdomains of the sampled population.

Study (WS Health) - Abbreviated term for current investigation of an epidemiologic study of the health of Whitchurch-Stouffville residents.

Study Design - A plan as to the type of evidence a study is to yield, and as to the approach to obtaining and summarizing such information. Also, the process of developing a study plan.

Sub-Areas - Areas within WS identified by varying labels of potential risk of exposure to chemicals from drinking water contamination. See MacLaren Report.

Survey - Generally, refers to studies involving the collection of sample data from predefined sources in a systematic and planned manner.

Symptoms - Perceived health problems (as opposed to diagnosed).

Target Population - The population of interest in a study.

Tec - Tecumseth.

Therapeutic Abortion (TA) - Induced abortion as reported by hospitals (for Ontario residents) regardless of gestational age and birth weight.

Therapeutic Abortion Rate - The number of therapeutic abortions per 1000 live births: $\frac{\text{TA x 1000}}{\text{no. of LB}}$

Sometimes this is considered as the ratio of TA and noted as percent of the live births, whereas the abortion rate is the no. of spontaneous abortions per 1000 women 15-44y.

Total Pregnancies - The sum of live births, stillbirths and therapeutic abortions. When available, spontaneous abortions are added.

Toxicology - A science that deals both with poisons and other substances to link their effect with health problems.

Unit(s) - See Sampling Unit.

Variable - A characteristic as represented in a statistical model, potentially taking on differing realizations among the units of observation (i.e., the members of the study population). Also, known as variate.

Variance - A measure of spread/dispersion or variability of some data distribution of interest. Typically, defined as the average of the squared deviations from the average (e.g., mean) of a distribution. The square root of the variance is known as the standard deviation.

WS - Whitchurch-Stouffville.